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State Forest Management Organizations in the EU: current performance and future trends

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Abbreviations and acronyms

AWU	Annual Work Unit
CF	The Cansiglio Forest
CSR	Corporate Social Responsibility
CR	Corporate Responsibility
EU	The European Union
EUSTAFOR	The European State Forest Association
EUR	Euro
GDP	Gross Domestic Product
GRI	Global Reporting Initiative
NGO	Non-Governmental Organisation
PCA	Principal Component Analysis
PES	Payment for Environmental Services
SCI	Site of Community Importance
SFE	State Forest Enterprise
SFI	State Forest Institutions
SFM	Sustainable Forest Management
SOE	State Owned Enterprise
SPA	Special Protection Area
SFMO	State Forest Management Organization
UNECE	United Nations Economic Commission for Europe
VA	Veneto Agricoltura

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Summary

Public institutions own the greater proportion of the world's forests and wooded areas —about 86% (Agrawal et al., 2008). In general, there are important regional variations of the proportion of state and private or municipal ownership. Recent European studies in the forestry sector show that nearly half of the European Union (EU) forests are publicly owned – around 42% (EUROSTAT, 2011; Schmithüsen and Hirsch, 2010; Pulla et al., 2013).

Considering the importance of forest resources, it is essential to ensure they are used sustainably. National governments and different agreements regulate use of forest resources; however, the actual manager has the greatest responsibility over the exploitation of the resource. Bearing in the mind the ownership structure of the forests in Europe, state forest organizations play an important role in the management of forest resources. This key place is justified by the overall duties they are dealing with and of course by their resourcefulness and significant influence on stakeholders (Krott and Stevanov, 2008). The future of forests and forestry strongly depends on the direction of state forest organizations development.

In fact, the forestry sector has undergone enormous changes in the past decades, but the forest institutions in many countries have been slow to adapt to these changes. Changes in the forest sector normally do not happen quickly, it takes a longer time that in other sectors. The main reasons to explain this fact are that, firstly, investments in forestry may take several generations to yield returns. Secondly, foresters are generally conservative, feeling more comfortable with forest botany rather than with social concerns that prevail forestry nowadays. Therefore, while the demands and expectations of society have changed, the structure of most forest institutions have remained largely unchanged (D'Silva, 1997). Despite the conservative mode of most forest institutions, a number of changes have taken place in the sector. Agrawal, Chhatre, and Hardin (2008) state that major features of modern forest governance include decentralization of forest management, logging concessions in publicly owned commercially valuable forests, and timber certification, mainly in temperate forests in the developed world and, additionally privatization of state-owned enterprises. In addition, the rise of labor costs and a decrease in timber prices forced the sector to undertake radical rationalization of production processes. It resulted in intensive mechanization of harvesting and personnel reduction (Kubeczko et al., 2006).

Despite the importance of state owned forest and the changes it faces, there is little literature about management of state forests, the lack of such literature is particularly palpable in the European countries. Therefore, this work aims to contribute to narrowing the knowledge gap about the topic by clarifying the role of state forest in the EU countries, its status, trends, challenges and opportunities. The work applies a combination of qualitative and quantitative methods, including a review of reporting system, qualitative, quantitate data analysis, Principal Component Analysis, cluster analysis and case study research. Chapter II of the dissertation investigates the reporting system of State Forest Management Organizations (SFMOs). This chapter explores how SFMOs report about their activities, what kind of information is available and the way they present it to the public. Therefore, the questions of transparency and accountability of State organizations are examined. Chapter III seeks to group SFMOs in the EU according to their management priorities and to see if they are influenced by characteristics of the forest sector of their countries. The existence of different forest management alternatives is essential for sustainable forest management (SFM) and this knowledge

should be shared between forest experts, the forest industry, and various interest groups. Chapter IV presents a discussion about a management model of the Cansiglio (CF) forest in Italy (a publicly owned forest) as a case study. In this case, I analyze the main priorities, outcomes and possible scenarios for the future development of this publicly owned forest.

In terms of the main findings about the information disclosure of SFMOs, there is the lack of a coordinated reporting framework or a minimum standard of indicators in common use. Comparability between SFMOs is limited due to the use of different indicators, periods and units of measure. Another important focus of the dissertation is the comparative synthesis of different management models of SFMOs; it can be observed that the countries under study show an application of different management priorities and SFMOs apply diverse business strategies. With the help of the cluster analysis, we obtained three SFMOs' clusters (C1, C2, and C3) and three outliers (O1, O2 and O3). The clusters present different approaches SFMOs use in prioritizing pillars of SFM: C1 has diversified goals, C2 behaves as a protector of public interests and C3 is commercially oriented. This division is partly defined by natural conditions of the country where the organizations are located, but also by the decisions of an organization itself (e.g. profit-oriented in Ireland, a country with a low forest cover and, on the other side, Czech Republic – profit oriented SFMO in the country with a high forest cover). The case study (the Cansiglio forest in Italy, Veneto region) presents a management model of a publicly owned forest with clear objectives and a vision for the next 5-10 years. The CF has diversified goals providing production of timber and social services. Specific attention is given to recreational activities as there is an increased demand from society for ecotourism and outdoor recreation. The management of the forest is performed by the regional administration together with some private actors (e.g. concessioner, logging companies). Among four presented scenarios, the fourth scenario "Long-term forest concessions signed by private enterprises" was evaluated as the most promising.

To conclude, SFMOs in Europe have adopted different organizational models in their management. However, they have common tendencies. Among the most notable are (i) they are owned by the state but function as a private unit; (ii) functions of supervision and management are separated and divided between different institutions; (iii) SMFOs often engage the help of private companies to perform some activities; (iv) SFMOs increase attention to the environmental and social pillar of SFM; (v) SFMOs have low level of information disclosure. As the main recommendations to SFMOs, there are two clear priorities: the need to optimize the balance between the three SFM pillars (social, economic and ecological) and also a need for improvement in their reporting systems and communications with the public.

Sommario

Le istituzioni pubbliche sono proprietarie della maggior parte delle foreste e delle altre aree boscate del mondo, circa l'86% (Agrawal et al., 2008). Esistono tuttavia importanti differenze a livello regionale nella proporzione tra proprietà statali, private o comunali. Studi europei nel settore forestale mostrano che quasi la metà delle foreste dell'Unione europea (UE) sono di proprietà pubblica - circa il 42% (EUROSTAT, 2011; Schmithüsen e Hirsch, 2010; Pulla et al., 2013).

Considerando l'importanza delle risorse forestali, è essenziale assicurarne un uso sostenibile. I governi nazionali e diversi accordi intergovernativi regolamentano l'utilizzo delle risorse forestali, tuttavia, sono i gestori forestali che hanno la più alta responsabilità sullo sfruttamento delle risorse forestali. Tenendo presente la struttura fondiaria delle foreste europee, le organizzazioni di gestione delle foreste demaniali hanno un ruolo importante nella gestione delle risorse forestali. Questa importanza è giustificata dagli impegni globali che hanno assunto e, naturalmente, dalle numerose risorse a disposizione e dall'influenza che hanno sugli stakeholder (Krott e Stevanov, 2008). Il futuro delle foreste e della gestione forestale dipende quindi fortemente dalla direzione di sviluppo delle organizzazioni di gestione delle foreste demaniali.

Il settore forestale ha subito enormi cambiamenti negli ultimi decenni, ma le istituzioni forestali di molti paesi sono state lente ad adattarsi a questi cambiamenti. I cambiamenti nel settore forestale normalmente non sono rapidi e sicuramente sono più lenti che in altri settori. Le ragioni principali per spiegare questo sono diverse. In primo luogo, gli investimenti forestali possono richiedere diverse generazioni per produrre ritorni d'investimento. In secondo luogo, i forestali sono generalmente conservatori, sentendosi più a proprio agio con la botanica forestale piuttosto che con le questioni sociali che prevalgono il settore oggi. Pertanto, mentre le esigenze e le aspettative della società sono cambiate, la struttura della maggior parte dei dipartimenti forestali è rimasta sostanzialmente invariata (D'Silva, 1997). Nonostante l'approccio conservativo della maggior parte dei dipartimenti forestali, numerose modifiche hanno avuto luogo nel settore. Agrawal, Chhatre e Hardin (2008) affermano che le principali caratteristiche di una moderna governance forestale includono il decentramento della gestione, concessioni di taglio in foreste pubbliche di alto valore commerciale e la certificazione forestale, soprattutto nelle foreste temperate del mondo sviluppato, oltre alla privatizzazione delle organizzazioni di gestione delle foreste demaniali. In aggiunta, l'aumento del costo del lavoro e la diminuzione dei prezzi del legname hanno costretto il settore a intraprendere una radicale razionalizzazione dei processi produttivi, risultata in intensa meccanizzazione delle utilizzazioni e della riduzione del personale (Kubeczko et al., 2006).

Nonostante l'importanza delle foreste statali e dei cambiamenti che sta vivendo, c'è una scarsa letteratura scientifica sulla gestione delle foreste statali, e questa mancanza è particolarmente riscontrabile in Europa. Pertanto, questo lavoro mira a contribuire alla riduzione del divario conoscitivo sul tema chiarendo il ruolo delle foreste statali nei paesi dell'UE, il suo *status*, le tendenze, le sfide e le opportunità. Il lavoro si basa su una combinazione di metodi qualitativi e quantitativi, tra cui una revisione del sistema di reporting, l'analisi quantitativa e qualitativa dei dati, la Principal Component Analysis, l'analisi dei cluster e casi studio. Il capitolo II della tesi esamina il sistema di *reporting* delle organizzazioni di gestione delle foreste demaniali. Questo capitolo esplora come le organizzazioni di gestione delle foreste demaniali riportano le loro attività, quali informazioni sono disponibili e il modo in cui le presentano al pubblico. Pertanto, anche le questioni della trasparenza e

della responsabilità delle organizzazioni statali sono incluse. Il capitolo III tenta di raggruppare le organizzazioni di gestione delle foreste demaniali dell'UE in base alle loro priorità e vedere se sono influenzate dalle caratteristiche del settore forestale dei loro paesi. L'esistenza di diverse alternative di gestione forestale è essenziale per una Gestione Forestale Sostenibile e questa conoscenza dovrebbe essere condivisa tra esperti forestali, industria e gruppi di interesse. Il capitolo IV presenta una discussione sul modello di gestione della foresta di Cansiglio in Italia (foresta di proprietà pubblica) come caso di studio. In questo caso, sono analizzate le principali priorità gestionali, i risultati e le direzioni future.

Dai principali risultati sulla divulgazione di informazioni delle organizzazioni di gestione delle foreste demaniali, emerge la mancanza di un quadro di *reporting* coordinato o di uno standard minimo di indicatori di uso comune. La comparabilità tra le organizzazioni di gestione delle foreste demaniali è tuttavia limitata a causa dei differenti indicatori, periodi e unità di misura. Un altro aspetto importante della tesi è la sintesi comparativa di diversi modelli di gestione delle organizzazioni di gestione delle foreste demaniali; si può osservare che i paesi in esame mostrano un'applicazione di diverse priorità di gestione e le organizzazioni di gestione delle foreste demaniali applicano diverse strategie di business. Con l'aiuto dell'analisi cluster abbiamo ottenuto tre *cluster* (C1, C2 e C3) e tre *outliers* (O1, O2 e O3). I cluster presentano diversi approcci che le organizzazioni di gestione delle foreste demaniali usano per le priorità dei pilastri della Gestione Forestale Sostenibile: C1 ha obiettivi diversificati, C2 si comporta come protettore di interessi pubblici e C3 è commerciale. Questa divisione è in parte definita dalle condizioni naturali del paese in cui si trovano le organizzazioni, ma anche dalle decisioni dell'organizzazione stessa (ad esempio, da un lato, in Irlanda è orientata al profitto in un paese con una bassa copertura forestale, dall'altro, in Repubblica Ceca, l'organizzazione di gestione delle foreste demaniali è orientata al profitto in un paese con invece un'alta copertura forestale). Il caso studio (foresta del Cansiglio in Italia, regione Veneto) presenta un modello di gestione di una foresta pubblica con traguardi specifici e una prospettiva di sviluppo per i prossimi 5-10 anni. La foresta del Cansiglio si pone diversi obiettivi per la produzione di legname e la fornitura di servizi sociali. Una particolare attenzione è rivolta alle attività ricreative in quanto vi si è creata una crescente domanda da parte della società per l'ecoturismo e la ricreazione all'aperto. La gestione della foresta viene eseguita dall'amministrazione regionale insieme ad alcuni gestori privati (ad esempio concessionari, imprese boschive). Tra i quattro scenari presentati, il quarto scenario "Concessioni forestali a lungo termine firmate da imprese private" è stato valutato come il più promettente.

Per concludere, le organizzazioni di gestione delle foreste demaniali in Europa hanno adottato diversi modelli organizzativi nella loro gestione. Tuttavia, hanno delle tendenze comuni. Tra i più notevoli sono le organizzazioni di gestione delle foreste demaniali (i) che sono posseduti dallo Stato ma che funzionano come unità privata; (ii) la maggior parte delle quali decide di separare le funzioni di supervisione e di gestione tra le varie istituzioni; (iii) che spesso impegnano l'aiuto di società private per svolgere alcune attività; (iv) che aumentano l'attenzione sul pilastro ambientale e sociale di gestione sostenibile delle foreste; (v) che hanno un basso livello di divulgazione di informazioni. Le prioritarie raccomandazioni per le organizzazioni di gestione delle foreste demaniali sono due: la necessità di ottimizzare l'equilibrio tra i tre pilastri di gestione sostenibile delle foreste (sociale, economico e ecologico) e di migliorare i propri sistemi di comunicazione con il pubblico.

Chapter I

Introduction

This Chapter is introductory to the thesis and presents the research background, defines problem statement of the study followed by research objectives and introduces the state of the art to the study.

1.1. Basic definitions

The research is focused specifically on State forest management in the EU and organizations that are involved in the management of the state properties in the forest sector. In this chapter, original terms from the literature are kept. One of the most common term is "state forest institution"; it is defined as an "organization that is bound to the particular system of rules, accomplish two main tasks: they directly manage state owned forests and act as an authority through the policy implementation, meaning provision of information, funding or other available policy instruments" (Stevanov and Krott, 2013, p.369). From this definition we see two main groups of tasks, that can differentiate forest institutions in two broad groups: "enterprise" (management task) and "authority" (authority task) (Stevanov and Krott, 2013). In this chapter, different terms are used to remain consistent with the terms used in published literature. However, the generic term that can be used to refer to these types of organizations is "State forest management organizations" (SFMOs). Therefore, in this thesis the term SFMO is used. It is used by the European State Forest Association (EUSTAFOR[1])" and it comprises all legal forms of forest management and ownership. EUSTAFOR further defines SFMOs as "commercially-oriented state forest companies, enterprises and agencies that have SFM and sustainable wood production as major concerns".

1.2. Forests in the EU

Forests are habitats for many species of fauna and flora, they help to mitigate global warming and protect from natural hazards. Additionally, they attract visitors and tourists wishing to enjoy a growing range of leisure activities and offer important opportunities for wealth and job creation in rural areas (EASAC, 2017). Therefore, sustainable forest management (SFM) policy stresses the need to satisfy multiple functions of forest landscapes including both wood production and delivery of environmental and social services. These goals are often conflicting and, therefore, hard to achieve at the same time in the same area. The EU members have strong legislation concerning SFM (European Commission, 2003). However, it is left to the legislation of each country to define specific rules and mechanisms of integrating the principle of multifunctionality of forests into actual forest management (Krott and Stevanov, 2008). Countries often transfer the responsibility of service delivery to State forest management organizations (SFMOs) due to their large resource base but also because private owners might refuse or simply do not have sufficient funds/competence to deliver some of the public services connected with forest ecosystems, for example recreation, biodiversity protection (World Bank, 2005a).

[1] The sample of SFMOs is based on EUSTAFOR membership

This thesis is focused specifically on the forest in the EU[2], where forests cover approximately 42% of the land area, 161 million hectares, which is about 5% of the world's forests (EASAC, 2017). The largest primary designated function of forests is production (mainly wood harvest, but also non-wood products), which was the stated function on more than half of the forest area in the EU in 2010, a total of 88.6 million hectares (EUROSTAT, 2011). The countries within the European region are very diverse due to different geographic and economic conditions, legal frameworks, historical and cultural circumstances. This diversity is reflected in the forest sector structures. From an ecological point of view, the EU's forests belong to many different biogeographical regions and have adapted to a variety of natural conditions, ranging from bogs to steppes and from lowland to alpine forests. If we look at socio-economical aspects, the EU's forests vary from small family holdings to state forests or large estates owned by companies, many as part of industrial wood supply chains (EUROSTAT, 2011). The EU increased its forest cover in the last decade with a rise of 2%. This happened mainly due to plantation programs on agricultural land that was no longer cultivated and also the abandonment process of forest land (EUROSTAT, 2011) in several rural areas.

1.3. State owned forest sector

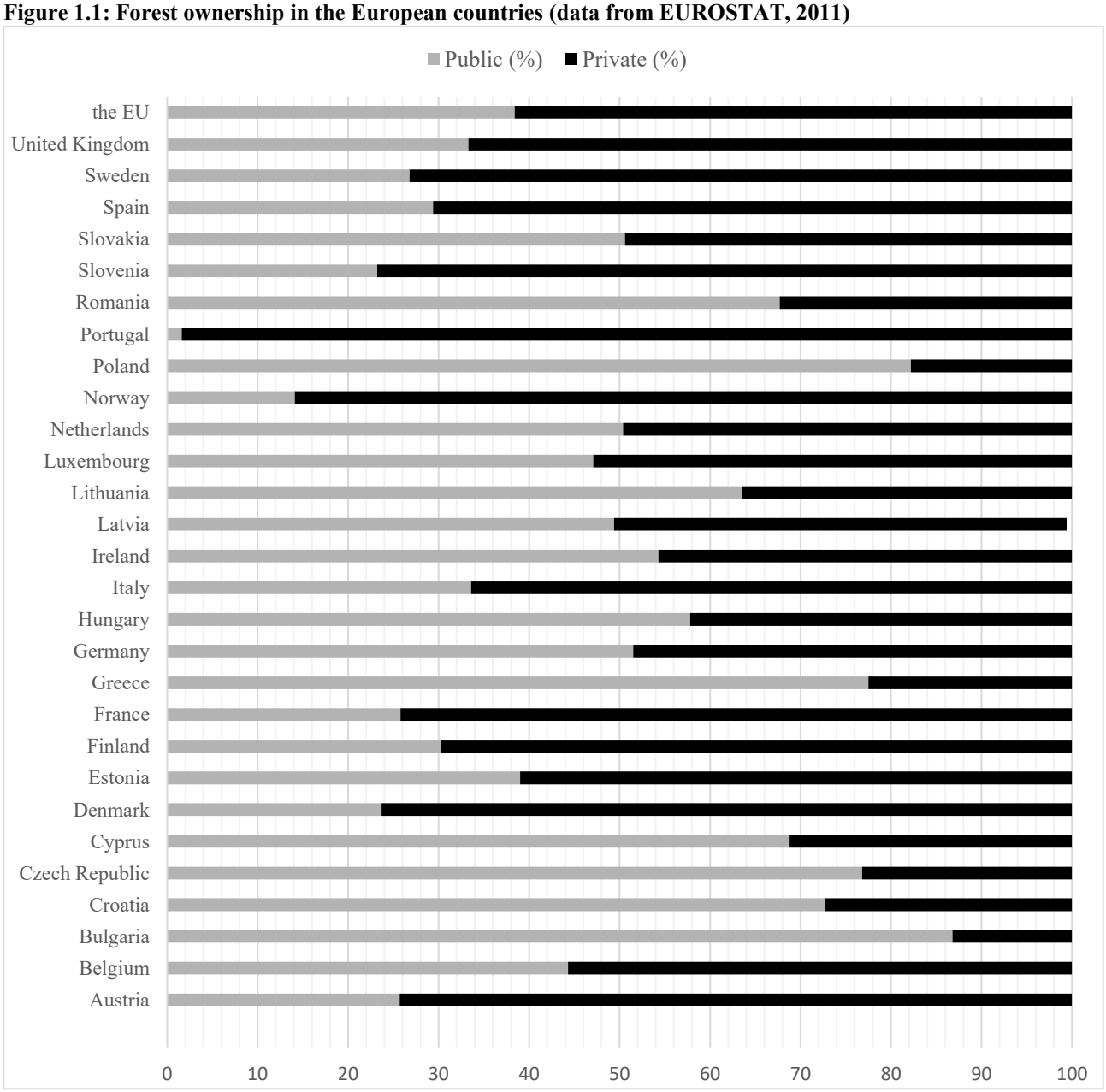
Around 40% of the forest area in the EU is state owned (see Figure 1.1). Based on data for 24 EU Member States (incomplete data for Greece, Portugal and Sweden), the state owned forest area decreased by a total of 2.9% between 2000 and 2010, whereas privately owned forest area increased by 8.6 % (EUROSTAT, 2011). It happened mainly to the privatization of forest resources in transition economies as the result of restitution program (Kant, 2009a). The major part of state owned forest in Europe is represented by European State Forest Association (EUSTAFOR) (around 30% of EU forests). It was established in 2006 and is recognized as the voice of European State Forest Management Organizations (SFMOs) (EUSTAFOR, 2016).

The SFMOs are key elements for forest governance and huge institutions even though the forest sector has only minor economic potential in Europe, if compared to other sectors like for example agriculture and tourism. Their key place in the forest sector is justified by duties, financial resources, and significant relationships with key stakeholders (Krott and Stevanov, 2008). These organizations play an important role in the formulation and state-wide implementation of forest policy. Moreover, they are also major economic actors as national governments typically transfer management rights to (one or more) state forest organizations (Stevanov and Krott, 2008). In last decades, state forest sector has been affected by the same challenges and drivers as society in general. Among the most important are changing consumer demands and values, globalization, privatization wave in Eastern Europe, budgetary shortage, climate change, the transition toward a bio economy and others (e.g., Näyhä et al., 2015; Kubeczko et al., 2006; Krott, 2008). However, regardless of the importance of SFMOs and many significant changes they have undergone in the last two decades, there is a notable lack of an overview of the patterns of state forest ownership in the EU countries. The increase in private ownership in the EU countries has sidelined research about state ownership. The majority of recent studies about State forest organizations, their management, performance and development in the forest sector are focused on the developing countries or countries in transition: China (Delang and

[2] In the Chapter III (Article 2) of the thesis the SFMOs from Norway "Statskog" is also included into the research sample even though Norway is not a part of the EU. It is explained by the fact that Norwegian SFMOs "Statskog" is a member of EUSTAFOR.

Wang 2013), Vietnam (World Bank, 2005b), Central and Eastern European Region (World Bank, 2005a) and few on European Union countries: Germany (von Detten and Faber, 2013), United Kingdom (Ambrose-Oji et al., 2015), Czech Republic (Kupčák, 2005), Lithuania (Brukas et al., 2011). Therefore, this dissertation aims to lay the groundwork for a richer understanding of the situation in state owned forests by empirically investigating a variety of aspects in state forest management in the EU and to capture the main models and trends that prevail in state management. Given the important role of SFMOs for sustainable forest management, it is necessary to develop a comprehensive EU-wide overview of SFMOs in order to identify priorities of their management and to evaluate their communication with stakeholders about SFM and corporate responsibility.

Figure 1.1: Forest ownership in the European countries (data from EUROSTAT, 2011)



1.4. Objectives and structure of the thesis

A general objective is to analyze the current state of SFMOs and their recent development in the EU, considering their relevant role in providing forest products and guaranteeing sustainable forest management (SFM).

Specific objectives are:

- to understand current practice among SFMOs in terms of SFM and corporate responsibility reporting;
- to analyze how SFMOs currently prioritize the three pillars of SFM (ecological, economic and social) in their management decisions and practices, by making a comparative overview;
- to present and discuss possible future scenarios of SFMOs' development and related challenges by using a case study in Italy.

This PhD work is a three-article based dissertation. Each article responds to one of the specific objectives. The sequence of the articles corresponds with order of the objectives above.

In the Chapter I, the topic of the research and its relevance is presented. It is followed by state of the art, where a thorough examination of state ownership and SFMOs is presented.

With the first specific objective, the research aims to understand how SFMOs implement principles of transparency and disclosure in their management. It was done through examining the reporting systems of SFMOs. In article 1[3] (Chapter II), a holistic picture of the reporting system, type of available information and importantly the gaps in the SFMOs' disclosure are presented.

The second specific objective, presented in article 2[4] (Chapter III), intends to investigate how SFMOs deliver a mix of social, environmental (including biodiversity conservation) and economic services in a sustainable way in their management and if their management priorities correlate with the overall trends in the forest sector of their countries. The management options selected may lead to many different outcomes depending on the initial state of the forest, and the end use of the harvested wood, so that complex trade-offs may emerge.

In the last specific objective, presented in the article 3 (Chapter IV), the focus is on the particular case of SFMOs' management – Cansiglio Forest, Italy. In the case study, I analyzed current management of the organization, its priorities and hypothetical scenarios of a future development of the Cansiglio Forest. This case gives an opportunity to see how an SFMO is functioning, how it deals with external and internal opportunities/obstacles, and what can be expected with a possible change of ownership.

The final Chapter V gives overall conclusions for the whole dissertation.

[3] This chapter is published as an article (Article 1). Details: Liubachyna. A.. Secco. L.. Pettenella. D.. 2017. Reporting practices of State Forest Enterprises in Europe. For. Policy Econ. 78. 162–172. doi:10.1016/j.forpol.2017.01.019

[4] This chapter is published as an article (Article 2). Details: Liubachyna, A., Bubbico, A., Secco, L., Pettenella, D., 2017. Management Goals and Performance: Clustering State Forest Management Organizations in Europe with Multivariate Statistics. Forests, 8(12), 504. https://doi.org/10.3390/f8120504

The order of the chapters (articles) does not follow the order in which the topics are presented in the subchapter "State of the Art". This is due to the fact that there is a limited availability of scientific literature on the topic of state forest management and ownership in the EU. Therefore, first I needed to explore existing published material concerning SFMOs' performances through their reports and official web pages. On the basis of the reports I was able to extract information about SFMOs and also evaluate their reporting systems (Article 1). After studying the reporting system of SFMOs, it became clear that different SFMOs use different approaches to forest management, as well as employing different business strategies and putting priorities on different pillars of sustainable development. Therefore, based on the analysis of the collected data, we understood how SFMOs prioritize their goals in regards to pillars of SFM (Article 2). The final part of my PhD was dedicated to the case study, where I tried to understand in more detail the reasons for changes and possible scenarios for the development in the CF, based on the current trends in SFMOs (e.g. emerging interest on ecosystem services, budgetary shortage, etc.).

This PhD work applies a variety of different methods, data analysis and interpretation. In Chapter II (Article 1) content analysis, sustainability metrics and a set of indicators to assess and analyze information in the reports of selected SFMOs were used. In Chapter III (Article 2), a principal component analysis and cluster analysis were performed. The analyses were based on the data from reports and data collected by means of questionnaires to the SFMO's representatives. In order to collect necessary data, a set of indicators was developed. This part of the thesis work was the most time consuming due to the lack of data availability and a low level of cooperation from the SFMOs. In Chapter IV (Article 3), a case study method and scenario analysis were used. Data was collected with the help of interviews with the employees of the CF and group of environmentalists.

Table 1.1 provides a brief overview of research objectives, methodology and research outputs.

Table 1.1: Summary of research objectives, methods and outputs

	Specific objective #1	**Specific objective #2**	**Specific objective #3**
Research objectives	To analyze the reporting systems of SFMOs	To make a comparative overview of SFMOs in the EU forest sector context with a specific focus on the way they prioritize three pillars of SFM	To describe in detail management model of SFMOs and its future scenarios in the Cansiglio Forest, Italy.
Research level and focus of the study	The EU	The EU	Local
Main method	Content analysis, report assessment was based on GRI Principles, metrics for sustainability performance	Principal Component Analysis (PCA) Cluster analysis	Case study
Data collection	From secondary sources	From secondary sources and questionnaires	From secondary sources, questionnaires and interviews with key-informants
Research Outputs	Chapter II: article 1 is published in the journal "Forest Policy and Economics", doi:10.1016/j.forpol.2017.01.019	Chapter III: article 2 is published the journal "Forests", 2017, 8(12), 504; doi:10.3390/f8120504	Chapter IV: article 3 will be submitted to an international peer review journal

State of the art

1.5. State ownership and State-Owned Enterprises

State-owned enterprises (SOEs) play an important role in the ownership landscape and in global markets (OECD, 2010). Defining SOEs can be a challenging task in today's changing environment. There are many definitions of SOE, Peng et al. (2016) synthetized the main concept of an SOE as a "firm that are (wholly or partially) owned and controlled by the state (government)". In the Table 1.2 definitions by international organizations are presented.

Table 1.2: Definition of SOE by international organizations (own elaboration)

Organization	Definition
OECD	SOEs are enterprises where the state has significant control, through full, majority, or significant minority ownership.
World Bank	SOEs are government-owned or government controlled economic entity that generates the bulk of its revenues from selling goods and services
European Commission	SOEs are those companies where, for various reasons, the state exercises control

SOEs are an enduring and evolving organizational form (Peng et al., 2016). Even after the privatization wave, the direct role of the state in the economy has not lost its relevance: there are still a number of SOEs in many countries and the sector is remarkable for its size, economic impact, and for the "strategic" sectors in which it operates (OECD, 2005). However, experience has shown that SOEs can be a source of concerns (European Commission, 2016; Shirley, 1999). Some studies suggest that they tend to be less efficient than private companies, because of lack of incentives associated with government ownership, and are associated with lower economic growth in developing countries (Kloviene and Valančienė, 2013). According to scholars (Chang, 2007; Bozec et al., 2002; Varcholova and Beslerova, 2013) the most common arguments against SOEs are:

- The Principal-Agent Problem: SOEs are not run by their owners. Unable to monitor them perfectly, the owners cannot tell how much of performance is due to managerial failure or external factors. This allows the managers to put in sub-optimal efforts (Chang, 2007). At the same time, managers in private entity are disciplined by an external control systems, such as the market for managers, and also by internal company mechanisms, such as compensation and rewards incentives (Bozec et al., 2002).

- The Free-Rider Problem: SOEs have numerous owners (all citizens). No individual owner (citizen) has the incentive to monitor the SOE managers as the benefits from monitoring will accrue to all owners while the costs are borne by the individuals who do the monitoring (Chang, 2007).

- The Soft Budget Constraint: Being part of the government, SOEs are able to secure additional financial assistance if their performance lags. This "freedom" makes the SOE managers slack in their management (Chang, 2007) and be less motivated to maximize profits. When managers of

private companies might experience threat of bankruptcy and takeover and as results it prevents them to look only for their own advantages (Bozec et al., 2002; Varcholova and Beslerova, 2013).

Due to the given arguments and considering increased globalization and liberalization, reforms in the state sector have been necessary primarily for three reasons: greater economic efficiency through increased private initiatives in economic activities; achieving higher levels of economic growth and employment; and reducing budgetary deficit (Bose, 2011). Caused by emerging reforms and changes, there are variety of ways to manage state assets.

1.6. Different ways of state ownership management

A key characteristic of SOEs today—and a reason why they have been able to prosper—is their ability to adapt and take on a new organizational form (cross reference Musacchio & Lazzarini (2014) from Bruton et al., 2015). Therefore, the reforming and restructuring of SOEs in order to improve their efficiency and ability to provide goods and services more effectively is a global trend. Governments generally have few tools to use in this situation, of which the most transformative is privatization (Nelson and Nikolakis, 2012). The objective of privatization is commonly perceived as bringing the SOE's efficiency into line with that of well-run private companies. From a practical point of view, privatization involves a change from state to private ownership for a part of or the whole SOE (European Commission, 2016). Privatization is definitely an option to consider for policy-makers interested in improving the performances of their SOEs (Kornai, 1992). Table 1.3 summarizes a number of key differences between firms with private and state ownership. While these differences are well known, a key new development since the late 20th century is that ownership boundaries are not fixed (Peng et al., 2016, Bruton et al., 2015).

Table 1.3: Private ownership versus state ownership from (Peng et al., 2016, p.299)

	Private ownership	State ownership
Objective of the firm	Maximize profits for private owners who are capitalists (and maximize shareholder value for shareholders if the firm is publicly listed).	Optimal balance for a "fair" deal for all stakeholders. Maximizing profits is not the sole objective of the firm. Protecting jobs and minimizing social unrest are legitimate goals.
Establishment of the firm	Entry is determined by entrepreneurs, owners, and investors.	Entry is determined by state officials and bureaucrats.
Financing of the firm	Financing is from private sources (and public shareholders if the firm is publicly traded)	Financing is from state sources (such as direct subsidiaries or banks owned by the state).
Liquidation of the firm	Exit is forced by competition. A firm has to declare bankruptcy or be acquired if it becomes financially insolvent.	Exit is determined by state officials and bureaucrats. Firms deemed "too big to fail" may be supported by taxpayer indefinitely.
Appointment and dismissal of management	Management appointments are made by owners and investors largely based on merit.	Management appointments are made by state officials and bureaucrats who may also use non-economic criteria
Compensation of management	Managers' compensation is determined by competitive market forces. Managers tend to be paid more under private ownership.	Managers' compensation is determined politically. Managers tend to be paid less under state ownership.
Ownership boundaries	Privately owned firms can be nationalized and turned into SOEs.	SOEs can be privatized. Even for SOEs in which state ownership is unchanged, they are not necessarily "state-owned and state-controlled".

Often SOEs are perceived strictly from dichotomous point of view as either state owned or privately owned (Bruton et al., 2015). The traditional SOEs, with high levels of ownership by government and correspondingly high levels of control, still exist. However, the presence of a rich range of cases in which ownership and control appear to be far more mixed supports an argument for the emergence of new forms of organization, in which public and private ownership and control mix to match the needs of the given setting (Bruton et al., 2015). This new form of SOEs that incorporate both state and private ownership are often called hybrid organizations (Bruton et al., 2015, Quélin et al., 2017, Pache and Santos, 2013). They are also defined as "organizational arrangements at the intersection of public, social and private spheres of economic activity" (Mahoney et al., 2009).

Quélin et al. (2017) in their article about public-private collaboration, hybridity and social values propose to look at organizations from the dimensions of hybridity in terms of governance and hybridity in terms of logics (see Figure 1.2). Low hybridity in governance means that organizations represent a unitary form with clearly defined boundaries, high hybridity in this dimension means that organizations rely on multiple, cross-sector partners. In the dimension of logic, low hybridity in logics suggests a setting in which the organization(s) follow a unitary set of beliefs, operating principles and norms; high hybridity indicates multiple logics (e.g. profit creation combined with social benefits). In Figure 1.2, we can observe four combinations of the two dimensions of hybridity and therefore 4 different types of organizations with different objectives and structures. For example, the left lower quadrant represents the case of traditional for-profit enterprises emphasizing the maximization of economic value creation. Socially oriented partnerships have high hybridity in both dimensions, presenting organizational form using different partnerships with an idea of increasing social benefits. The other two combinations depict organizations with high and low hybridity each in one dimension (social enterprise and classic public private contract) (Quélin et al., 2017).

Figure 1.2: The two dimensions of organizational hybridity (from Quélin et al., 2017, p.772)

Hybridity in logics	Low hybridity in governance	High hybridity in governance
High	**Social enterprise** Unitary organizations pursuing social benefits along with economic/efficiency objectives	**(Blended) socially oriented contract/partnership** Public-private partnerships or cross-sector alliances with emphasis on social benefits combined with the pursuit of economic/efficiency gains
Low	**For-profit enterprise** Unitary organizations focusing on economic benefits	**Classic public-private contract/partnership** Procurement-based public-private partnerships or cross-sector alliances focusing on economic/efficiency gains

The restructuring of SOEs can lead to different governance arrangements and organizational forms. These can range from explicitly corporate like structures that directly imitate private sector enterprise, although ownership may be mixed (where the government may own all or some of the

shares), to different governance arrangements that formally introduce different levels of autonomy, to maintaining existing political and hierarchical relationships, and simply implementing market-like practices and behaviors (James, 2005). However, implicit in this process are decisions around how much political autonomy to give to the new entity, as well as financial autonomy. In the Figure 1.3 we can see a variety of organizational forms that fluctuate depending on governmental control (see more examples in Box 1.1) and financial independency.

Box 1.1: Company classification due to the amount of state shares

The EC gives possible distinctions that can be made between companies depending on the number of state shares, irrespective of other statutory rights. This may be an important distinction since mixed-owned companies may be exposed to stronger market pressure influencing their management. SOEs can therefore include in particular the following categories:
− companies fully owned by public authorities;
− companies where public authorities have a majority share;
− companies where public authorities retain a minority share but have special statutory powers;
− companies where public authorities have a minority share and no special powers. These are generally not considered as SOEs however they may be of relevance in order to obtain a fuller picture of governments' stake in the economy (EC, 2016).

Figure 1.3: Variety of organizational forms (from MacCarthaigh, 2011, p.5)

Public Funding	Distance from Central Government Control			
	High ⟷ Low			
	Ministerial Department Central Government Offices	Executive/ Departmental Agency	Non - departmental Agency	Private Organizations (performing public functions)
		Partially publicly-funded bodies	Public-Private Partnership	
Private/ Self Funding			Commercial State-owned Enterprises	Private companies

Management technologies and different solutions for the improvement of SOEs performance without privatization are moving from redesigning existing arrangements to more fundamental ones:

- legal restructuring involving separating out commercial and regulatory responsibilities;
- operational restructuring affecting the management and staffing of the enterprise;
- outsourcing of selected services and functions;
- strategic restructuring, changing the SOE`s objectives and strategies;
- explicit corporatization of the SOEs involving financial restructuring through the issue of shares (cross reference - OECD 2003 from Nelson and Nikolakis 2012, James 2005).

The last proposed solution for the improvement of SOEs is typically known as "corporatization". In this case, a government retains ownership of the SOE but restructures the enterprise to operate on a more business-like basis. Corporatization has been used generally to describe the transformation of state agencies either to give them a more market- oriented focus or to adopt more business like methods (Williamson, 2000). Stiglitz (2000) has described it as an intermediate step towards privatization. Nelson & Nikolakis (2012) defined it as a process that has different institutional outcomes, but the main goal is to improve performance focused on social efficiency, which "in its simplest form involves reducing the cost of supplying the public good or service, or providing more value given the resources employed in providing them".

As it was stated before, SOEs are often perceived as less efficient than privately owned companies. However, by the process of corporatization SOEs try to catch up with private competitors. On top it was supported by a general shift by governments' withdrawal from directly providing goods and services that can be provided by the private sector (Nelson and Nikolakis, 2012). It was shown the sources of efficiency engendered by corporatization can be traced to the reform of the internal governance structure of these firms. The results indicate that, even without privatization, corporate governance reform is potentially an effective way of improving the performance of SOEs; such reforms represent a policy alternative for countries seeking to restructure SOEs without massive privatization. The results also suggest that it may be optimal for governments to carry out corporatization of SOEs before eventual privatization (Aivazian et al., 2005).

A natural question is: Why was corporatization effective? By structuring the internal governance system of SOEs according to that of a modern corporation, corporatization may enhance efficiency through better monitoring of managers, improvements in information-sharing channels, and a reduction in governmental political intervention. It may also affect the incentives and objectives of managers by tightly linking enterprise performance with the evaluation and remuneration of managers. It may also impact, positively or negatively, on the "soft budget constraint" faced by SOEs. On the one hand, the government may want to force corporatized firms to face greater competition and to increase the efficiency of credit allocation to SOEs. At the same time, the government has strong incentives to provide financial support to such firms and to prevent their bankruptcy because of the heavy political and social costs that would be engendered (Aivazian et al., 2005).

1.7. State Forest Management Organizations

In this work, the focus is on specific subset of SOEs: State Forest Management Organizations (SFMOs). They have traditionally played a major role in the forestry sector in European countries. Due to the multi-functionality of forests, forest organizations can provide different services and are also obliged to fulfil specific needs and functions. World Bank (2005a) highlighted three main groups of functions of forest organizations; however, they are not strictly limited only to the functions presented below:

Policy and Legislation:

1. Policy setting
2. Legislation and regulation
3. Enforcement of the legal framework

Forest management services:

1. Forest management planning
2. Fire and pest management
3. Forest inventory
4. Forest roads construction and maintenance
5. Forest regeneration
6. Management for recreational uses
7. Management for conservation
8. Management for the provision of environmental services such as watershed protection

Other services:

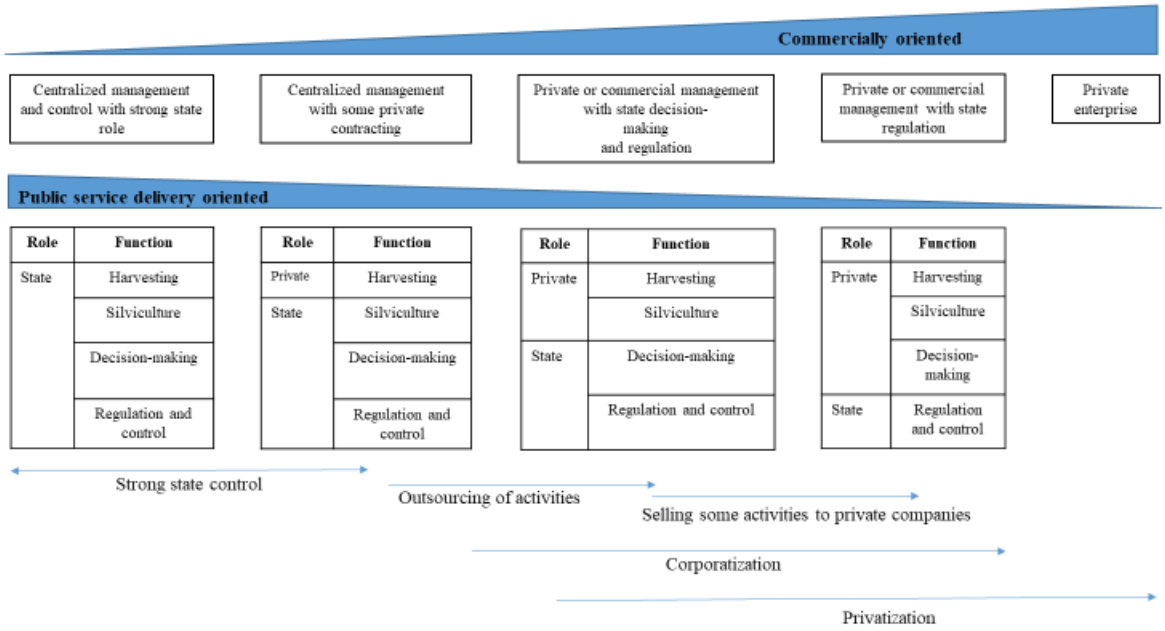
1. Sale of timber and timber products
2. Sale of non-timber products
3. Marketing services (both timber and non-timber forest products)
4. Socio-economic services to local communities, derived from state-owned forests (fuelwood, non-timber forest products, grazing resources, etc.)
5. Forest extension services to private owners/ users.

These functions are normally divided among multiple entities both within the public sector - authority organizations (e.g. Ministry, agency) and management organizations (e.g. enterprises), as well as outside of it (Stevanov and Krott, 2008), i.e. the private sector and civil society organizations. This brings us to the idea that there are variety of ways to organize forest organizations and to divide function between them. We cannot say that there is one ideal way to do it. In fact, there is very little empirical research to show that organizational structures, themselves, are the key element to the reform process. To the contrary, the evidence strongly suggests that the functional form of a forest organization simply does not matter. Very different models can succeed, and very different models can fail (World Bank, 2005a).

So, what are the models for forest organizations? There is no one strict division, in fact forest organization models can depend on different factors such as the way the forest is managed (Brukas and Weber, 2009), how the functions are divided between different forest institutions; to what extent the state is involved in the management of state organizations (World Bank, 2005a; Sotirov, 2014). For example, Sotirov (2014) points out three models of institutional structure of the state forest sector: (i) integrated state forestry, (ii) separated state forestry, and (iii) privatized forestry. Another division of state organizations was presented by the World Bank study on OECD countries: (i) centralized management and control with strong state role, (ii) centralized management with some private contracting, (iii) private or commercial management with state decision-making and regulation, (iv) private or commercial

management with state regulation (more details in World Bank, 2005a). Figure 1.4 shows the range of different solutions for SFMOs: from centralized and regulated to decentralized and heavily commercialized forest organizational set-ups, finishing with full privatization of state property. Additionally, the main processes happening in state forest ownership are highlighted (Sotirov, 2014; World Bank, 2005a; Kant, 2009b; Chang, 2007).

Figure 1.4: SFMO management models (own elaboration based on PROFOR (2005), Sotirov (2014), Kant (2009), Chang (2007))



While these models come with some specific differences, there are some common trends in state forest ownership in the European countries. In most countries, there has been a general trend towards separation of state regulatory and economic management functions. It is a results of the lack of financial means for the SFMOs that became the driving force of reforming the SFMOs in the last decades (Krott, 2008). It gave a push to many SFMOs to make a "profit generating" goal as a primary one even if it is well known that the obligation of state forests is much broader than simply making money. There is no doubt that making profit cannot be the only criterion for the success of the state forests, rather the fulfilling of all requirements stated in forest-policy programs (Stevanov and Krott, 2008; Sotirov, 2014). However, the change into a commercially state forest organization has already and will in the future change the way forestry is managed in European countries. By reducing the tasks in which the state plays a leading role, it leads forestry to be more open to the demands of the market (Krott, 2008).

The process of changing to a commercially managed state forest organization is different in its practical implementation depending from country to country. The creation of a state enterprise is the most dominant mode of recent forest tenure reforms, however there are also different methods of formation and organizational structure (e.g. state forest enterprises that essentially function as companies (Sweden, Austria); forest enterprises within the state forestry agencies (the United Kingdom, Germany)). Establishment of a state enterprise has some advantages as compared to corporations and privatization. There is no need for valuation of forest assets, no

need of capital and investors, flexibility for state agencies in terms of division of responsibilities, and high acceptability by different stakeholders. Another important point is that the cost of creation of state enterprises within the state agency will be much lower than the cost of privatization and corporatization (Kant, 2009b). Amongst state forest enterprises which have undertaken the new role of profit seeking organization, there is some evidence that income levels have increased, while institutions which have failed to reform are finding they continue to be sometimes heavily subsidized and fail to generate significant added tax revenues or other sources of income to the state (World Bank, 2005a).

However, a creation of commercially managed state forest enterprise has disadvantages. Kant (2009b) in his work about recent global trends in forest tenures highlights that state enterprises can be criticized for the lack of professionalism, government control, and the same organizational culture as the state agencies. In addition, as with any emergent activities, a creation of state enterprises with their profitable objectives can pose new challenges to regulatory institutions. First is a reconciliation of producing profit with the objective of long-term SFM. Second is possible conflicts between state agencies with different functions in the forest sector, which can result in economic inefficiencies. Third, the challenges and therefore the performance of the newly created state enterprises depend on the social, economic, and legal environment of the country. For example, the challenge of a state enterprise in highly competitive economies, where only small forest area is managed by a state enterprise and large forest area is managed by private enterprises – is quite different from the challenges of a state enterprise in a country where large forest area is under state control and competition is limited. Hence, the separation of regulatory and commercial functions is a complex process and, for the efficient outcomes, the management of this process is as difficult and challenging as the management of any other organization (Kant, 2009b).

However, not all SFMOs go for the creation of commercially managed organization. There are other solutions that allow SFMOs respond to new demands of the market and deliver their functions in the efficient ways. For example, methods such as deregulation and increased competition, or more routine steps such as public-private partnerships (Sturla, 2012), or outsourcing of public sector services can effectively substitute outright privatization (Aivazian et al., 2005; Kloviene and Valančienė, 2013). These different ways of cooperation are playing a relevant role in boosting forest management in rural areas of Europe, where logging activities are being progressively abandoned, as this poses serious threats to the conservation and management of forests and thus the public benefits they provide (Sturla, 2012). In fact, SFMOs already outsource some economic management activities (e.g. timber harvesting and transport, forest management planning) to the private sector (Sotirov, 2014). These processes are often followed by organizations where the state gradually goes through the process of corporatization[5] and sells some activities to private companies up to complete separation and even possible privatization of state organizations. A general trend is when an organization decides to be profit oriented rather than service delivery oriented, it starts to move more towards privatization, however, not a compulsory full privatization process.

[5] Corporatization is generally used to describe the transformation of state agencies either to give them a more market-oriented focus or to adopt more business-like methods (Shirley, 1999). Stiglitz (2000) has described it as an intermediate step towards privatization.

We can see that the state sector is actively using the help of private sector (e.g. public private collaboration) and state owned organizations are becoming so called "hybrid" in the way they are managed. These changes were often performed with a general aim to improve state sector efficiency SFMOs need to comply not only with efficiency goals, but also with SFM[6] principles.

1.8. SFM and different approaches to prioritize its goals

Unlike many other organizations, forest organizations work with a natural resource and within a very vulnerable ecosystem. These facts give some restrictions to the way SFMOs can operate and limit them by the characteristics of the specific resource. Natural resources are location specific and they take a relatively long time to develop. Therefore, management and use of natural resources is strictly regulated (Chang, 2007). In the forest sector SFM principles are used in order to maintain the resource. The concept of SFM gives guidelines on how to manage forests in order to satisfy today's needs and not compromise the options of future generations (United Nations, 1992). In SFM as in sustainable development in general, all three pillars (economic, social and environmental) should be taken into account and be reflected in the management of SFMOs. Forest in its turn can make significant contributions to all three pillars of sustainable development: the forest sector contributes to the economy, forest ecosystems provide multiple products and services for well-being of society and environmental protection (MacDicken et al., 2015). However, it is a challenge for SFMOs to manage the forest in a way such that it produces economic benefits without compromising social and environmental services the forest can create. For example, what is economically SFM for a forest owner (e.g. SFMO) might be a much less sustainable forestry practice for society, and vice versa (Brukas et al., 2015).

Many forest regions and therefore SFMOs located in these regions experience growing and conflicting demands for forest service and functions. The SFM and forests' conservation together with a variety of social needs and demands remain a major challenge to address in a forest management system (Borrass et al., 2017; Beland Lindahl et al., 2017). These demands range from from biomass/wood production, biodiversity conservation, aesthetic and cultural values to the importance of forests for climate change mitigation As a result, existing forest policies and their mechanisms for balancing competing interests are being seriously challenged, and many countries are struggling to incorporate these new demands within their existing policies and management practices (Borrass et al., 2017). Therefore, various approaches to SFM have been developed by different countries and their SFMOs.

In the following, we present how different countries respond to pressing sustainability challenges in their forest management and prioritize between goals of SFM taken from Beland Lindahl et al. (2017) . Similarly, in Chapter III of this thesis we will see how specific forest institutions, i.e. SFMOs, prioritize pillars of SFM in their management. Therefore, it is useful first to understand what approaches have been implemented by different countries as a response to the new demands and sustainability challenges

[6] SFM defined in 1993 by the Helsinki Resolution H1 as *"the stewardship and use of forests and forest lands in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems".*

in the forest sector. Beland Lindahl et al. (2017) highlight 5 approaches that illustrate different potential ways for countries to make trade-offs between goals of SFM.

The first type of approach is called "More of Everything". Countries such as Finland and Sweden are examples of this solution (Kröger and Raitio, 2017; Beland Lindahl et al., 2017). The main idea is that it is possible to create more of existing resources. The principal response to increasing demand is expansion and integration, mainly based on developing bio-economy. Policy goals are aggregated and the intention is to realize them in an integrated manner across all land types, irrespective of tenure. Its strengths include its focus on broadening out, to address new sustainability challenges, include new goals, seek ways to integrate policy across sectors, promote deliberation and introduce new management approaches (Beland Lindahl et al., 2017). A prevalent solution is to use forest and increased wood production in order to combat with multiple sustainability challenges by means of bioenergy as well as traditional timber and pulp- wood products. Hence, a growing bio-economy can become a vehicle to develop synergies between increased wood production and urgent environmental objectives.

The second type of solution is "More Development" and it is based on stimulating an increased level of production. Brazil is an example of this solution. However, it is important to remember that the primary challenge in this case is to feed a growing population and increase social welfare in the developing world. Therefore, this scenario has strong inter-sectoral linkages between forest-, agro- and other resource-extraction businesses. It is important to monitor use of the land as there is a risk of land conversion due to the need for raw materials for the forest industry and land for food production (Beland Lindahl et al., 2017).

"Diversification" approach is well observable in Canada. In some Canadian provinces, insufficient economic results in the forest sector and disputes with environmentalists have resulted in a diversification of tenures and transfer of forest management decision- making from authorities to communities. Additionally, there are a number of voluntary agreements to manage public forests for increased environmental and social benefits and there are increasingly participatory processes to diversify the industrial sector and the economic revenues from Canadian forests. Jointly, these provincial and voluntary initiatives managed to elevate the environmental and social dimensions of sustainability. Engagement with stakeholders and active conflict management help to make trade-offs between conflicting objectives in a tenure-based land use and management system in which the majority of land is under public control (Beland Lindahl et al., 2017).

"Multifunctionality" is an approach based on the idea of balancing the three pillars of sustainability, e.g. Germany. It is perceived as an example for integrating diverse (societal and ecological) demands into a timber oriented management approach (Borrass et al., 2017). German forest policy is heavily influenced by public opinion, whereby recreational and other social forest values are given priority. Therefore, the social and economic pillar of SFM have been significantly strengthened. However, Germany now faces an increased demand for domestically produced bioenergy feedstock and competition for land use is expected to intensify. As a result, the need for a more efficient and economically profitable forestry is increasing (Beland Lindahl et al., 2017).

The last approach is called "Monofunctional Zoning". It is based on the idea of separating forest management goals by tenure. So, the three SFM pillars (environmental, economic and social objectives) are maximized on separate pieces of land, which are generally managed by separate

institutions. Examples of this approach can be seen in Australia and New Zealand. Policy objectives, implementation strategies and results differ according to tenure and sector, and the trade-offs between potentially conflicting objectives are therefore specific to tenure arrangements, land use allocation and associated sectoral competition. "Monofunctional Zoning" can ensure that all aspects of sustainable development are addressed by separating goals by tenure. However, lack of integration, and coordination may also inhibits ecologically functional planning (Beland Lindahl et al., 2017).

All outlined approaches have their strengths and weaknesses, and all struggle with particular challenges. This analysis showed that there is no on perfect approach for responding to all the sustainability challenges that forest sector is currently facing. Encouraging an active process revealing and reflecting on the similarities, differences, success and failure of these alternative approaches to SFM among countries and SFMOs is an essential part of developing better ways to deal with arising problems and deliver better result.

1.9. Reporting as a disclosure tool between public and SFMOs

We can observe variety of ways to respond to the new challenges and integrate sustainability principles in the forest management. It is due to the organizations in charge of management to decide the best way to do it. At the same time, it is essential to make organizational goals clear to the public and to show that public resources are used efficiently and for the benefit of the population. A growing awareness about sustainability issues among various stakeholders groups resulted in the emergence of ethical, social and environmental issues in accounting and reporting practices (Farneti and Rammal, 2013). Therefore, public agencies have a new type of accountability challenge (Kubo, 2004). OECD (2015) also highlights the importance of principles of transparency and disclosure for state organizations.

To ensure an appropriate disclosure and transparency at the state level, a coherent disclosure policy should first be developed for its portfolio companies. This policy should identify what information should be disclosed; how and to whom the information should be disclosed; and the procedures for ensuring the quality of the information. Once the disclosure and transparency policy is in place, the state should make sure that it is implemented at company level (OECD, 2010). The OECD (2010) guidelines consider "aggregate reporting as a key disclosure tool directed to the general public, Parliament and the media" (p. 78). An adequate reporting is a crucial step towards state organization objectives that often go beyond profit maximization and include societal and environmental objectives (European Commission, 2016). Reporting systems help to establishes grounds for both the public sector and private sector where they can see sustainability as a shared responsibility (Kubo, 2004). However, while there has been an increase in the number of studies investigating the reporting practices of private sector enterprises, research on sustainability reporting in the public sector remains rare (Farneti and Rammal, 2013). The Global Reporting Initiative (GRI) also suggests that enterprises in the public sector have a responsibility in the delivery of goods and services, using the resources available, to further the cause of sustainable development in the public interest (GRI, 2014). Therefore, in order to effectively promote the principles of SFM, the public sector should lead by example by reporting its activities in a transparent manner.

In the case of SFMOs, the business activities are performed in the forest, an ecosystem that has a crucial role in sustainable development, not only because of its unique raw material base but also because of its influence on local communities and the wellbeing of society (Toppinen et al., 2012).

Therefore, principles of transparency and accountability should be integral part of their external communication policy. However, previous research in the forest industry (Toppinen et al., 2012, Mikkilä and Toppinen, 2008, Vidal and Kozak, 2008) have raised doubts about appropriate usage of reporting systems by the forest companies. Therefore, the adoption of an external reporting standard such as the Global Reporting Initiative (GRI, 2014) has been suggested by scholars (Panwar et al., 2006). This will help to improve the quality of reporting with the main aim of improving the quality of the content, reliability, credibility, and timeliness of reporting practices (Toppinen et al., 2012; OECD, 2005). Sustainability reporting can be used by SFMOs to provide information about challenges and achievements in their forest management to the stakeholders. Additionally, it can be a marketing tool to promote social and environmental campaign performed by SFMOs and to share experience and good practices in the implementation of SFM. It also helps to maintain transparency and to respond to emerging issues and pressures (Azapagic, 2003; Morioka et al., 2016)

1.10. References

Agrawal, A., Chhatre, A., Hardin, R., 2008. Changing governance of the world's forests. Science (80-.). 320, 1460–1462. doi:10.1126/science.1155369

Aivazian, V.A., Ge, Y., Qiu, J., 2005. Can corporatization improve the performance of state-owned enterprises even without privatization? J. Corp. Financ. 11, 791–808. doi:10.1016/j.jcorpfin.2004.11.001

Ambrose-Oji, B., Lawrence, A., Stewart, A., 2015. Community based forest enterprises in Britain: Two organising typologies. For. Policy Econ. 58, 65–74. doi:10.1016/j.forpol.2014.11.005

Azapagic, A., 2003. Systems Approach to Corporate Sustainability: A General Management Framework. Process Saf. Environ. Prot. 81, 303–316. doi:http://dx.doi.org/10.1205/095758203770224342

Beland Lindahl, K., Sandström, C., Sténs, A., 2017. Alternative pathways to sustainability? Comparing forest governance models. For. Policy Econ. 77, 69–78. doi:10.1016/j.forpol.2016.10.008

Borrass, L., Kleinschmit, D., Winkel, G., 2017. The "German model" of integrative multifunctional forest management—Analysing the emergence and political evolution of a forest management concept. For. Policy Econ. 77, 16–23. doi:10.1016/j.forpol.2016.06.028

Bozec, R., Breton, G., Côte, L., 2002. The Performance of State-Owned Enterprises Revisited. Financ. Account. Manag. 18, 383–407. doi:10.1111/1468-0408.00158

Brukas, V., Kuliešis, A., Sallnäs, O., Linkevičius, E., 2011. Resource availability, planning rigidity and Realpolitik in Lithuanian forest utilization. Nat. Resour. Forum 35, 77–88. doi:10.1111/j.1477-8947.2011.01380.x

Brukas, V., Mizaras, S., Mizaraite, D., 2015. Economic forest sustainability: Comparison between Lithuania and Sweden. Forests 6, 47–64. doi:10.3390/f6010047

Brukas, V., Weber, N., 2009. Forest management after the economic transition : at the crossroads between German and Scandinavian traditions. For. Policy Econ. 11, 586–592. doi:10.1016/j.forpol.2009.08.009

Bruton, G.D., Peng, M.W., Xu, K., 2015. State-owned enterprises around the world as hybrid organizations. Acad. Manag. Perspect. 29, 92–114. doi:10.5465/amp.2013.0069

Chang, H., 2007. State-Owned Enterprise Reform, Policy notes in United Nations Department of Social and Economic Affairs (UNDESA). New York, NY, USA.

D'Silva, E., 1997. Why institutional reforms in forestry? Lessons from international experience. Nat. Resour. Forum 21, 51–60. doi:10.1111/j.1477-8947.1997.tb00672.x

Delang, C.O., Wang, W., 2013. Chinese forest policy reforms after 1998: the case of the Natural Forest Protection Program and the Slope Land Conversion Program. Int. For. Rev. 15, 290–304. doi:10.1505/146554813807700128

EASAC, 2017. Multi-functionality and sustainability in the European Union's forests.

European Commission, 2016. State-owned enterprises in the EU: lessons learnt and ways forward in a post-crisis context. Brussels, Belgium. doi:10.2765/99224

European Commission, 2003. Sustainable forestry and the European Union. Initiatives of the European Commission. Luxembourg.

EUROSTAT, 2011. Forestry in the EU and the world — A statistical portrait. Publications Office of the European Union, Luxembourg city, Luxembourg. doi:10.2785/13022

EUSTAFOR, 2016. Managing State Forests in Europe, European State Forest Association. Brussels, Belgium.

Farneti, F., Rammal, H.G., 2013. Sustainability Reporting in the Italian Public Sector : Motives and Influences, in: APIRA CONFERENCE. Kobe, Japan.

GRI, 2014. G4 Sustainability Reporting Guidelines, Global Reporting Initiative. Amsterdam, The Netherlands.

James, W., 2005. The impact of corporatisation and national competition policy. Leadersh. Organ. Dev. J. 26, 289–309. doi:10.1108/01437730510600661

Kant, S., 2009a. Sale of Canada's public forests: Economically non-viable option. For. Chron. 85, 841–848.

Kant, S., 2009b. Recent global trends in forest tenures. For. Chron. 85, 849–858.

Kloviene, R., Valančienė, L., 2013. Performance measurement model formation in municipalities. Econ. Manag. 18, 383–393. doi:10.5755/j01.em.18.3.4224

Kornai, J., 1992. The principles of privatization in Eastern Europe. Economist (Leiden). 140, 153–176. doi:10.1007/BF01460369

Kröger, M., Raitio, K., 2017. Finnish forest policy in the era of bioeconomy: A pathway to sustainability? For. Policy Econ. 77, 6–15. doi:10.1016/j.forpol.2016.12.003

Krott, M., 2008. Forest government and forest governance within a Europe in change, in: Cesaro, L., Gatto, P., Pettenella, D. (Eds.), The Multifunctional Role of Forests: Policies, Methods and Case Studies. EFI Proceedings, pp. 13–27.

Krott, M., Stevanov, M., 2008. Comprehensive comparison of state forest institutions by a causative benchmark-model. Ger. J. For. Res. 179 (4), 57–64.

Kubeczko, K., Rametsteiner, E., Weiss, G., 2006. The role of sectoral and regional innovation systems in supporting innovations in forestry. For. Policy Econ. 8, 704–715. doi:10.1016/j.forpol.2005.06.011

Kubo, N., 2004. Public agency sustainability reporting. GRI 46.

Kupčák, V., 2005. Elementary financial analysis of the Forests of the Czech Republic, state enterprise. J. For. Sci. 51, 127–140.

MacCarthaigh, M., 2011. Managing state-owned enterprises in an age of crisis: an analysis of Irish experience. Policy Stud. 32, 215–230. doi:10.1080/01442872.2011.561688

MacDicken, K.G., Sola, P., Hall, J.E., Sabogal, C., Tadoum, M., de Wasseige, C., 2015. Global progress toward sustainable forest management. For. Ecol. Manage. 352, 47–56. doi:10.1016/j.foreco.2015.02.005

Mahoney, J.T., McGahan, A.M., Pitelis, C.N., 2009. The interdependence of private and public interests. Organ. Sci. 20, 1034–1052. doi:10.1287/orsc.

Mikkilä, M., Toppinen, A., 2008. Corporate responsibility reporting by large pulp and paper companies. For. Policy Econ. 10, 500–506. doi:10.1016/j.forpol.2008.05.002

Morioka, S.N., Evans, S., Carvalho, M.M. De, 2016. Sustainable Business Model Innovation: Exploring Evidences in Sustainability Reporting. Procedia CIRP, 13th Glob. Conf. Sustain. Manuf. - Decoupling Growth from Resour. Use Sustain. 40, 660–668. doi:10.1016/j.procir.2016.01.151

Näyhä, A., Pelli, P., Hetemäki, L., 2015. Services in the forest-based sector – unexplored futures. Foresight 17, 378–398. doi:10.1108/FS-08-2013-0034

Nelson, H.W., Nikolakis, W., 2012. How does corporatization improve the performance of government agencies? Lessons from the restructuring of state-owned forest agencies in Australia. Int. Public Manag. J. 15, 364–391. doi:10.1080/10967494.2012.725323

OECD, 2010. Accountability and Transparency. A guide for state ownership. OECD Publishing.

OECD, 2005. Corporate governance of state-owned enterprises. A Survey of OECD countries. OECD, Paris, France.

Pache, A.C., Santos, F., 2013. Inside the hybrid organization: Selective coupling as a response to competing institutional logics. Acad. Manag. J. 56, 972–1001. doi:10.5465/amj.2011.0405

Panwar, R., Rinne, T., Hansen, E., Heikki, J., 2006. Corporate responsibility balancing economic, environmental, and social issues in the forest products industry. For. Prod. J. 4–12.

Peng, M.W., Bruton, G.D., Stan, C. V., Huang, Y., 2016. Theories of the (state-owned) firm. Asia Pacific J. Manag. 33, 293–317. doi:10.1007/s10490-016-9462-3

PROFOR, 2005. Experiences and Lessons from Eastern Europe Europe and Central Asia Region.

Pulla, P., Schuck, A., Verkerk, P.J., Lasserre, B., Marchetti, M., Green, T., 2013. Mapping the distribution of forest ownership in Europe.

Quélin, B. V., Kivleniece, I., Lazzarini, S., 2017. Public-private collaboration, hybridity and social value: towards new theoretical perspectives. J. Manag. Stud. 54, 763–792. doi:10.1111/joms.12274

Resolution H1, 1993. . Second Ministerial Conference on the Protection of Forests in Europe, Helsinki.

Schmithüsen, F., Hirsch, F., 2010. Private Forest Ownership in Europe. United Nations, Geneva.

Shirley, M., 1999. Bureaucrats in business: The roles of privatization versus corporatization in state-owned enterprise reform. World Dev. 27, 115–136. doi:10.1016/S0305-750X(98)00130-2

Sotirov, M., 2014. A policy and institutional analysis of forest sector reforms in Central and Eastern Europe.

Stevanov, M., Krott, M., 2013. Measuring the success of state forest institutions through the example of Serbia and Croatia. Int. For. Rev. 15, 368–386. doi:10.1505/146554813807700146

Stevanov, M., Krott, M., 2008. Shaping future with forests through state forest institutions - Potentials of using a benchmarking model as a decision-making support 720–727.

Stiglitz, J.E., 2000. Economics of the public sector. W.W. Norton.

Sturla, A., 2012. Public-Private Partnership as a way to restore forest management. Some evidence from Liguria. L'Italia For. e Mont. 299–309. doi:10.4129/IFM.2012.3.08

Toppinen, A., Li, N., Tuppura, A., Xiong, Y., 2012. Corporate responsibility and strategic groups in the forest-based industry: exploratory analysis based on the Global Reporting Initiative (GRI) framework. Corp. Soc. Responsib. Environ. Manag. 19, 191–205. doi:10.1002/csr.256

United Nations, 1992. Agenda 21, Rio Declaration, Forest Principles. New York.

Varcholova, T., Beslerova, S., 2013. Ownership structure and company performance: Research and literature review. e-Finanse Financ. Internet Q. 9, 24–33.

Vidal, N.., Kozak, R.., 2008. The recent evolution of corporate responsibility practices in the forestry sector. Int. For. Rev. 10, 1–13. doi:10.1505/ifor.10.1.1

von Detten, R., Faber, F., 2013. Organizational decision-making by German state-owned forest companies concerning climate change adaptation measures. For. Policy Econ. 35, 57–65. doi:10.1016/j.forpol.2013.06.009

Williamson, O., 2000. The new institutional economics: taking stock, looking ahead. J. Econ. Lit. 38, 595–613.

World Bank, 2005a. Forest Institutions in Transition: Experiences and Lessons from Eastern Europe. Washington, DC, USA.

World Bank, 2005b. State forest enterprise reform in Vietnam : review of policy and implementation framework for Decree 200 - technical note. Washington, DC, USA.

Chapter II

Article 1: Reporting practices of State Forest Enterprises in Europe[7]

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2.1. Abstract

Forests provide a wide range of public services to communities and, for this reason, public authorities in many countries have a relevant role both as land owners and as providers of raw material and public services. This article focuses attention on State Forest Enterprises (SFEs) based in Europe. They manage state-owned forest areas, which amount to more than 40% of all forest cover in the EU and hence their performance influences the development of the whole sector, maintaining forest resources stability and productive potentials. This should be done through stakeholders' inclusiveness etc., so it is necessary to monitor their activities and further impacts. The common way to do this is through reporting practices. Information disclosed in reports can provide insights into the level of transparency, accountability and openness. Thus, this article aims to analyze the reporting systems of SFEs in terms of sustainable forest management and corporate responsibility.

We used content analysis, sustainability metrics and a set of indicators to assess and analyze patterns and structure of disclosed information in the reports of selected SFEs. Results revealed much diversity in approaches towards the implementation of sustainability standards. It is suggested that the adoption of a common scheme for periodic reporting will allow communication to a wider public and comparative analysis of SFEs on a large scale.

Key words: State forest enterprise, forest governance, European forestry, reporting practice, corporate responsibility.

2.2. Introduction

Concepts of "Corporate Social Responsibility"[8] (CSR) and the frequently used expression "Corporate Responsibility"[9] (CR) have assumed a key role in inspiring the business world during the

[7] We used the term State Forest Enterprises (SFE) in the Article 1 (Chapter II) as it was inherited from the literature used for the article. Based on this part of the research, we concluded that more appropriate term to use is SFMOs as it includes the whole range of different organizations in charge of state forest in Europe and it is also used by EUSTAFOR.

8 Corporate Social responsibility (CSR) is "a concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis. Being socially responsible means not only fulfilling legal expectations, but also going beyond compliance and investing "more" into human capital, the environment and the relations with stakeholders" (European Commission, 2001 p.6).

[9] For this study we decided to use the term "corporate responsibility" (definition is the same as for CSR) even though the term "corporate social responsibility" is better recognized. Both terms refer to the social, environmental and economic

last decades. Different industries, companies, international and local governmental bodies have adopted CR as part of their reporting routines. Environmental, or corporate (social) responsibility, or sustainability reports have become common tools for disclosing companies' performances in implementing their CSR strategies (Mikkilä and Toppinen, 2008).

Since the 1970s, public attention towards impacts on forest resources by different industries has increased a lot. Forest resources are often treated with special deference by society because they provide different functions including the provision of ecosystem services, biodiversity habitat, wood and non-wood products, and water resources. Increased levels of social knowledge and expectations for transparency in operations have stimulated new responsibility standards for the forest sector also as concerns reporting tools. The industry has responded by implementing new environmental and social policies intended to satisfy public concerns (Panwar et al., 2006). Forest sector companies have widely embraced CR reporting in order to manage the company's reputation and receive stakeholders' support (European Commission, 2001).

CR of pulp and paper companies was investigated by Mikkil and Toppinen (2008); Vidal and Kozak (2008) and Li and Toppinen (2011) analyzed CR practices in the wood-working sector while so far no study has attempted to analyze CR of SFEs. Among the companies operating in the forestry sector State Forest Enterprises (SFEs) play a relevant role, specifically in Europe. The responsibility of SFEs is to manage State forests under special contractual agreements with State authorities (Krott and Stevanov, 2008). They are responsible for maintaining ecosystem services and social benefits from the forest. Despite recent changes in forest ownership and tenure in some regions, most of the world's forests remain under the public ownership. According to the Global Forest Recourse Assessment (FAO, 2010), 84% of forest land is publicly owned, mostly under the direct control of central governments. Hirsch and Schmithüsen (2010) in a study on private forest ownership in Europe, based on the Global Forest Resources Assessment, 2005, estimated the distribution of ownership as 58% for private forest and 42% for public in the countries of western and central Europe. However, the percentage share of private forest is significantly reduced if we consider the ownership structure at a European continental scale, including the Russian Federation, Belarus and Ukraine, where up to 100% of forests are publicly owned (Schmithüsen and Hirsch, 2010).

Considering the importance of State forest, the aim of this paper is to fill a knowledge gap about SFEs by examining their report practices. The background and study justification are briefly outlined based on the concept of CR reporting as well as an explanation about the role of State forests in European forestry. After describing the research methodology, an analysis of the reporting practices is presented. The final part of the paper gives the conclusions with some suggestions for supporting the development of CR practice[10].

responsibilities of businesses, but "CSR" might give the impression that social aspects are being emphasized more than the other two dimensions. At the same time the term "corporate responsibility" provides more clarity in so much as it implies that all three dimensions are being taken into account (Vidal and Kozak, 2008).

[10] In this paper the term "reporting practice" will refer to the way SFEs report about their performance to the public.

2.3. Background and study justification

2.3.1. CR reporting

Reporting and communicating about company`s performance helps to demonstrate transparency and seriousness of intent about CR. Thus, big corporations nowadays generally produce annual reports of their responsibility efforts. This trend began as environmental reporting and has developed into a wider concept including other aspects of responsibility. Organizations build their CR through the Triple Bottom Line, meaning adding two dimensions (social and environmental) to an organization's traditional reporting methods focused on financial performance. This reporting practice is usually known as a sustainability report (Baviera-Puig et al., 2015). Under this approach the Global Reporting Initiative[11] (GRI) sustainability reporting guidelines were first developed with the aim of assisting "reporting organizations and their stakeholders in articulating and understanding contributions of the reporting organization to sustainable development" (Kubo, 2004). Up to the KPMG (2015) survey about CR reporting, GRI guidelines remains the most popular voluntary reporting scheme worldwide.

Another trend that has become increasingly popular in the field of reporting practice in the last decade is the "Integrated report", a comprehensive document composed of a number of parts connecting non-financial data (including data from the activity report, ESG (Environmental, Social and Governance) reports and intellectual capital reports) with financial data (from the financial statements). Integrated reports are useful for stakeholders if they are delivered on time and prepared in a reliable manner. As a tool for communication, an Integrated report should contain relevant and complete information and take into account stakeholders' expectations and interests (Szczepankiewicz and Mućko, 2016).

However, there is some criticism about reporting practices and different guidelines. Moneva et al. (2006) state that preliminary evidence seems to show that reporting guidelines may be used in a biased way. For example, some GRI reporters' organizations do not behave in a responsible way with respect to social equity (health care companies in Africa) or human rights (some oil companies in developing countries). This can be explained by wrong interpretation of the concept of corporate responsibility during transmission into guidelines and indicators or by simplifying the concept. It often creates a gap between corporate performance and corporate impacts (Moneva et al., 2006). There is a need to check that reports are in line with the concept of corporate responsibility and represent the real impacts of company activities.

One of the main purposes of reporting is to track and improve company performance. Another is corporate communication. Communication with stakeholders is necessary to capture the reputation benefits of CR. External reporting provides an opportunity to stakeholders to judge an organization's performance and make knowledgeable decisions about possible cooperation or the way a company influences environment and society. However, one of the biggest challenges is to present information corresponding to all expectations of different stakeholders (Dawkins, 2004). Good reporting practice

[11] GRI is an international independent organization that helps businesses, governments and other organizations understand and communicate the impact of business on critical sustainability issues such as climate change, human rights, corruption and many others. The GRI Sustainability Reporting Guidelines (the Guidelines) offer Reporting Principles, Standard Disclosures and an Implementation Manual for the preparation of sustainability reports by organizations, regardless of their size, sector or location. (www.globalreporting.org)

includes features such as relevance of information, access to more information when needed, comparability and consistency over time (Székely and Knirsch, 2005). However, in the last analysis of CR reporting, KPMG (2015) highlighted that many reports are still fragmented and inconsistent approaches are used with patchy transparency. A lot of important information is missing from many annual financial and corporate responsibility reports. The information that companies report and how they report it varies widely both within and between different geographical and industry sectors. There is therefore a need to develop clear, user friendly methodologies for reporting about company`s sustainability progress (Székely and Knirsch, 2005). This topic has gained a lot of scientific interest in recent years because it is essential to understand mechanisms that contribute to effective CR communication tailored to each stakeholder (Du et al., 2010).

2.3.2. CR reporting in forestry

Among environmentally-sensitive sectors, the forest-based industry plays a crucial role in sustainable development, but it is often under-represented in studies about CR practice or reporting (Li et al., 2011). If we look at the history of CR in the forest sector, the current multi-dimensional CR reporting was introduced by environmental reporting. By the mid-1990s, most European forest products industries published environmental reports on a regular basis. In the last decade, forest sector companies have moved towards more comprehensive responsibility reports, with a focus on all three dimensions of sustainability: economic, environmental, and social (Panwar et al., 2006). In a study on CR in the forest-based industry Li and Toppinen (2011) summarized four key trends in reporting activities within the forest industry. One of the key issues is to acknowledge not only financial performance but also to disclose information about social and environmental impact and try to do this in an understandable and clear way for different stakeholders. Secondly, forest companies have understood and defined their CR largely based on activities related to sustainable forest management (SFM) and accountability, among a number of emerging economic, environmental and social issues. Third, the forestry sector has moved towards a more holistic and integral approach to CR and sustainability initiatives, where large forest companies shape their social performance strategies to fit their geographical profiles (Mikkilä and Toppinen, 2008). The fourth evident trend is that companies with a strong financial performance tend to pay more attention to their CR strategy. This means planning environmental and communication strategy, or adopting a more comprehensive risk management strategy; engaging different CR activities with more resources (including funds and staff) to deal with emerging sustainability issues (Li and Toppinen, 2011).

Monitoring forest health and vitality is important because any decline may have significant economic and ecological consequences for society, including loss of forest benefits and degradation of environmental quality. A range of natural and human-caused disturbances may affect the health and vitality of forests. Many international agreements (e.g. the International Tropical Organization, European Union, Montreal Process) therefore present indicators and criteria for monitoring forest management practices. However, it has been noticed that optimizing forest management, or finding an acceptable level of achievement across incommensurate criteria from different agreements is extraordinarily difficult (McDonald and Lane, 2004). At the same time, the growing public interest and global awareness of environmental and social issues has intensified pressure on companies in the forest sector and forced them to rethink their strategies towards sustainable forest management and its disclosure to the public. In order to do this, SFEs should improve the robustness, credibility, reliability and consistency of their reporting practices (Toppinen et al., 2012). The Hickey et al.

(2006) study about information reporting for SFM also suggests further support for the idea that information available for evaluating and comparing forest management practices should be similar in different jurisdictions. This will help to generate a better practical understanding of forest management practices in different authorities, especially when designing "best" forest management standards. To avoid lack of verification in reporting practices and to increase disclosure of information by forest-based industry companies, adoption of a consistent external reporting standard (e.g. GRI) is suggested (Panwar and Hansen, 2007).

2.3.3. SFEs in Europe: an overview

The distribution of State and private forests in countries varies widely in Europe (Table 2.1). For example, private forests in Austria, France, Norway, Slovenia and Sweden account for more than 75% of the total forest area of the country. Instead, countries like Poland, Bulgaria, Czech Republic and Croatia have only 15-30% of private forest. Such a difference in ownership can often be due to historical reasons and further changes in the forest sector. In the majority of countries, there have been notable changes in the structure of holdings during the last 15-20 years. For instance, the privately owned area in Ireland and Norway has increased due to reforestation of marginal agricultural and pastureland. In Slovenia State forests decreased due to denationalization. In Central and Eastern European countries, considerable shifts in ownership structure have occurred due to restitution and privatization processes (Bulgaria, Czech Republic, Latvia and others) (Schmithüsen and Hirsch, 2010).

Table 2.1: Forest area and ownership in EU + Norway, Bosnia and Herzegovina, 2010 (Eurostat) and membership in EUSTAFOR (http://www.eustafor.eu/)

Country	Forest (1000 hectares)	Public (%)	Private (%)	Name of EUSTAFOR member
Austria	3,887	25.7	74.3	Österreichische Bundesforste AG (ÖBF)
Belgium	678	44.3	55.7	Inverde
Bosnia and Herzegovina	2,709	81	19	ŠGD "HERCEGBOSANSKE ŠUME" D.O.O.
Bulgaria	3,927	86.8	13.2	Ministry of Agriculture and Food
Croatia	1,920	72.7	27.3	Hrvatske šume *
Czech Republic	2,657	76.8	23.2	Lesy Ceske Republiky
Cyprus	173	68.7	31.3	-
Denmark	544	23.7	76.3	-
Estonia	2,217	39	61	State Forest Management Centre
Finland	2,2157	30.3	69.7	Metsähallitus
France	15,954	25.8	74.2	Office national des forêts
Greece	3,903	77.5	22.5	-
Germany	11,076	51.5	48.5	Bayerische Staatsforsten AöR, Landesbetrieb ForstBW, Landesbetrieb Forst Brandenburg, ThüringenForst AöR, Landesforst Mecklenburg-Vorpommern, Niedersächsische Landesforsten, Landensforstbetrieb Sachsen Anhalt
Hungary	2,029	57.8	42.2	Ministry of Agriculture
Italy	9,149	33.6	66.4	Associazione Nazionale delle Attività Regionali Forestali*
Ireland	739	54.3	45.7	Coillte

Latvia	3,354	49.4	50	Latvijas valsts mezi (LVM)
Lithuania	2,160	63.5	36.5	Directorate General of State Forests
Luxembourg	87	47.1	52.9	-
Malta	0	0	0	-
Netherlands	365	50.4	49.6	-
Norway	10,250	14.1	85.9	Statskog*
Poland	9,337	82.2	17.8	The State Forests National Forest Holding (Lasy Panstwowe)
Portugal	3,456	1.6	98.4	-
Romania	6,573	67.7	32.3	ROMSILVA
Slovenia	1,253	23.2	76.8	Farmland and Forest Fund of the Republic of Slovenia
Slovakia	1,933	50.6	49.4	LESY Slovenskej republiky
Spain	18,173	29.4	70.6	-
Sweden	28,203	26.8	73.2	Sveaskog
United Kingdom	2,881	33.3	66.7	Forest Enterprise England (Forestry Commission)*, Forest Enterprise Scotland*, Natural Resources Wales*

- not a member of EUSTAFOR

* Associated Member

Note: % of State Owned forests are not reported and compared with public and total forests because of the limited and not homogenous information about the real extent of this part of public ownership.

Almost all SFEs in Europe are represented under the EUSTAFOR[12] umbrella. EUSTAFOR currently has 30 members in 22 European countries. Members represent the majority of EU countries, Norway and Bosnia and Herzegovina. EU countries not represented in the Association are Denmark, Greece, Spain, Cyprus, Luxembourg, Malta, The Netherlands and Portugal. Germany is represented by seven enterprises; three institutions represent the United Kingdom. EUSTAFOR's members account for one third of the EU's forest area, including the management of 13 M hectares of protected areas. Their combined annual harvest amounts to approximately 123 M m³ of round timber. Together the members provide employment for more than 100,000 people (EUSTAFOR, 2016).

2.3.4. Institutional and governance changes in SFEs

Currently, the institutional structure in the forest sector in Europe is changing substantially. During the last decades, the legal framework under which forestry operates has altered greatly because of appearance of new international agreements, conventions, etc. These stimuli are strong both at country level and within the global context (PROFOR, 2005). One of the important causes for change is economic conditions that have become harsher for wood producers. The mode of governance in the forest sector has also changed. The State is redefining its dominant role in the sector, trying to reduce it. Other changes have been caused by technological progress, especially in

[12] The European State Forest Association (EUSTAFOR) is an organization that represents commercially-oriented State forest companies, enterprises and agencies. The main goal of EUSTAFOR is to support and strengthen State forest management organizations in Europe, in order to provide sustainable forest management by helping them to maintain and enhance their economically viable, socially beneficial, culturally valuable and ecologically responsible practices (EUSTAFOR, 2016).

respect to sawmill industry, where huge economies of scale brought about a broad rearrangement of the demand side in the timber trade (von Detten and Faber, 2013). Moreover, the perception of how to manage a forest is different now because of incorporation of the idea of sustainability in forestry. Due to these reasons, the mode of governance and institutions development is constantly changing. Nowadays, due to growing budget constraints in most European countries, the economic performance of State forest institutions gains increasing importance in the reforming discussions. A prominent argument of the reforming debate is that State forest institutions are too expensive. The simplicity of the argument that State forests should make profits gives political strength to this goal; even if it is well known that the obligations of State forests are much broader than just making money. In nearly all European countries forest law formulates specific public tasks for the State forests comprising economic and other benefits like recreation, protection and biodiversity. In the last decade, the reforms of the forest law, especially in Eastern Europe, have underlined the importance of sustainable forest management, which aims at the multiple-use of forests. Therefore, making a profit cannot be the only criterion for the success of the State forests but the fulfilling of all requirements stated in forest-policy programmes (Krott and Stevanov, 2008). Consequently, State forest institutions have changed their functions, structure and responsibilities. They should therefore be examined in order to understand their role in forestry and how they influence the development of the forest sector. With the power and resource base SFEs have, they need to be more accountable, a requirement that can be satisfied by public reporting.

2.4. Materials and method

In order to reach the objective of the study we used the content analysis technique for analyzing SFEs` reports. Content analysis is the most common method in analyzing CR reporting (Szczepankiewicz and Mućko, 2016). It is done by detecting the presence or absence of information covering a number of different subject areas in enterprises` disclosure.

We used the fundamental GRI Reporting Principles in order to help us in the assessing of the SFEs` reporting practices. GRI is used as a kind of "ideal" standard (Panwar et al, 2006), thus we can check the gap between the SFEs reports and an ideal report designed on the basis of GRI standards. As stated by GRI "It is only when you look at how a report conforms to the fundamental GRI Reporting Principles that you can make a clear assessment of its quality" (Ligteringen & Arbex 2011, p.48). There have been other studies aiming to assess reports in different industries (e.g. Skouloudis et al., 2010; Baviera-Puig et al., 2015; Isaksson & Steimle, 2009). They also based their indicators for the report assessment on the GRI Principles.

The choice of indicators for the report assessment was based on GRI Principles (see Table 2.2). The Principles and therefore corresponding indicators are divided into two groups: Principles for Defining Report Content and Principles for Defining Report Quality (GRI, 2014). The indicator on Sustainability content was divided into three subgroups: economic, social and environmental. Each indicator was scored between 0 and 2 points (with a possible maximum score of 24). When a Principle aligned with a corresponding indicator was not applied in the assessed report then an indicator received no points; brief or generic application received 1 point, the maximum score was given to an indicator when its corresponding Principle was fully applied in the reports. The analysis was based on all the available reports with 2014-2015 as the year of reference (see Table 2.5).

Table 2.2: Indicators used for the report assessment based on the principle of GRI (Global Reporting Initiative 2014b with own elaboration)

	Indicator	Explanation
Report content	Materiality	The report should cover Aspects that Substantively influence the assessments and decisions of stakeholders (economic, environmental, social impacts and in case of forest enterprises also forest management)
	Stakeholder Inclusiveness	The organization should identify its stakeholders, and explain how it has responded to their reasonable expectations and interests.
	Sustainability Context (economic, environmental, social)	The report should present the organization's performance in the wider context of sustainability (economic, social and environmental performance)
	Completeness	Used to refer to practices in information collection and whether the presentation of information is reasonable and appropriate
Report quality	Balance	The report should reflect positive and negative aspects of the organization's performance to enable a reasoned assessment of overall performance.
	Comparability	The reported information should be presented in a manner that enables stakeholders to analyze changes in the organization's performance over time
	Accuracy	The reported information should be sufficiently accurate and detailed for stakeholders to assess the organization's performance.
	Timeliness	The organization should report on a regular schedule so that information is available in time for stakeholders to make informed decisions.
	Clarity	The organization should make information available in a manner that is understandable and accessible to stakeholders using the report.
	Reliability	Independent auditor should check the report.

For this research, we also applied an approach known as a metrics for sustainability performance in order to measure and assess SFEs reporting practice towards CR and specifically to reveal information disclosed in the sustainability context. This approach was described by Székely and Knirsch (2005) and used by Mikkil and Toppinen (2008) to assess pulp and paper companies' practices. The approach has already been examined for the forest sector and can also be used for assessing SFEs` reporting. Sustainability metrics constitute economic, social and environmental metrics. Forest management practices are included in environmental metrics. Considerations for each of the metrics are presented in Table 2.3.

Table 2.3: Considerations for sustainability metrics (based on Székely and Knirsch, 2005 and Mikkil and Toppinen, 2008 with own elaboration)

Economic metrics	Environmental metrics	Social metrics
• Financial performance Indicators: net profit/earnings/income, gross margin • Tangible and intangible investments: capital investments, R&D, knowledge, human capital, reputation, brands, networks, partnerships • Impacts on investors: return on capital deployed, SD investments with expected shareholder value implications, shareholder accountability	• Sustainable forest management (Forest certification, silviculture measures, forest area parameters) • Management of pollution (Emissions, including climate change issues, Solid waste) • Energy • Recycling of raw materials, products and waste	• Employment (Total number, salaries, training, age, gender distribution) • Health and safety (Accidents) • Stakeholder engagement • Corporate citizenship (Philanthropic contributions and programmes, Human rights)

The list of SFEs was based on EUSTAFOR membership (Table 2.1). In order to analyze reporting practices of SFEs, we concentrated on their published annual reports and corporate responsibility (CR)/sustainability/integrated reports. In their study about corporate brand trust Kim et al. (2015) proved that reports, either printed or on-line, are the preferred method for communication by stakeholders, despite the variety of communication options: websites, advertising, corporate media releases, etc. The reports were downloaded from the websites of SFEs.

There were some limitations to the study. Enterprises were selected from the list of EUSTAFOR members by the criteria: (i) to actually be an enterprise; (ii) to have published reports in English. Information provided in the reports is assumed to honestly reflect the activities of enterprise. It is important to note that in this study the reports were analyzed, the way they are structured and what kind of information they contain, not the performance of SFEs per se. Therefore, possible lack of reporting or a negative evaluation of reporting practice does not necessarily mean negative performance in reality. A final total of 9 SFEs matched the criteria. In future researches we aim to increase number of SFEs and scope of the study.

2.5. Results and discussion

General information about selected SFEs is presented in Table 2.4. All SFEs are for-profit-companies. Their main source of profit is the traditional production of timber. However, many are trying to develop other business activities, like the production of renewable energy, real estate, consulting etc. One reason for this is that many SFEs are self-funded. In addition, some of them need to pay a dividend or so–called "rent fees" to the State for managing land, as in the case of the Austrian ÖBF. SFEs are therefore not just restricted nowadays to timber production, but also develop new activities using multi-functionality of forest ecosystems.

Table 2.4: General information about selected SFEs (own elaboration), 2014-2015

Country, SFE	Area of enterprise, 1000 ha	Forest area, 1000 ha	Turnover, mil Euros	Annual profit, Mil Euros	Employees, #	Legal form of organization	Main fields of activity
Sweden Sveaskog	4,040	3,120	-	213	851	Joint Stock company (100% State)	Sells saw logs, pulpwood, and chips, biofuel and tree seedlings, provides silvicultural services, forest management, sales and leases of land
Poland The State Forests National Forest Holding (Lasy Panstwowe)	7,605	7,285	-	-	25,433	State enterprise as a government department (not a legal entity)	Sales of timber
Ireland Coillte	445	397	282.9	47.6	928	Joint stock company owned by the State	Businesses in forestry, land management, renewable energy and the manufacture and export of wood based panel products.

Czech republic Lesy Ceske Republiky	1,300	1,287	520*	147.5	3,335	State enterprise under the general law	Forest management
Austria Österreichische Bundesforste AG (ÖBF)	850	511	231.2	23	1,096	Joint Stock company (100% State)	Timber sell, real state, renewable energy, hunting and fisheries, services segment
Finland Metsähallitus	12,538	9,131	335.98	105.9	1,549	State enterprise	Management of state-owned multiple-use forests, sales and marketing of timber, estate agency, seeds sell, leasing of soil and rock extraction sites and sale of soil and rock resources, hunting and fishing license
Estonia State Forest Management Centre (RMK)	1,279	908	165.2	32.9	726	Profit-making State agency governed by the Ministry of Environment	Sale of timber, hunting activities
Latvia Latvijas valsts mezi (LVM)	1,620	1,590	275.7	60.5	-	Joint stock company which manages State-owned forest property	Production of assorted round timber, forest renewals, cultivation, tending, forest stocktaking, forest road construction, repairs and maintenance, real estate management.
Scotland Forestry Commission Scotland	-	1,400	-	-	139	The Scottish Government's forestry advisor and regulator. Forest Enterprise Scotland has operated as the executive agency of Forestry Commission	Key priorities are to support the expansion, protection and sustainable management forests,working to deliver the government's priorities on tackling climate change, economic development and community empowerment.

* - Revenues. Turnover is not presented in the report of Lesy Ceske Republiky

2.5.1. Overview of reports

Reports vary a lot among SFEs (Table 2.5). The number of SFEs that have reports is not high. The average score for the analysed reports is 19.1 out of 24. Czech Lesy Ceske Republiky has the highest score of 24 points, followed by Estonian RMK and Finnish Metsähallitus with 23 points, Austrian ÖBF – 22 points. It is important to notice that Swedish Sveaskog has a well-developed Sustainability report (22 points), however the average score of its other evaluated reports is only 19.3 points. In fact, Sveaskog is the only SFE following GRI reporting guidelines. Irish Coillte used to follow GRI guidelines until 2013 in its Sustainability report, but in 2014-2016 it issued only Annual reports. CR reporting is developing in SFEs: 7 out of 9 SFEs have either Integrated or Sustainability reports, only Latvian LVM has just a Financial report, Polish State Forests National Forest Holding has an Environmental report.

Report content is generally weaker than report quality. The weakest part of reports is social in *sustainability context* and *stakeholders' inclusiveness*. Both these indicators are interconnected and influence other indicators, especially *materiality* of the report. It is a very difficult task to identify all stakeholders and meet all their demands; however, this should be done. Unfortunately, some SFEs (Forest Commission Scotland) focus attention only on employees, not considering local communities, NGOs, etc. The social part of reports is sometimes limited to number of employees and salary received; even a well-developed report like that of Estonian RMK has a weak social part (no information about working conditions, gender issues, injures). Apart from the social part, the sustainability context of reports is well developed. Some SFEs like ÖBF and Sveaskog even present their own sustainability metrics (Table 2.6). In the case of ÖBF it is Sustainability Balanced Scorecard (SBSC) of ÖBF AG – a three-dimensional measurement of profit and loss (economy, society, nature); Sveaskog has a target set for 2019 in different areas of corporate sustainability, such as preferred choice for employees and contractors, customer satisfaction etc. Instead, Forest Commission Scotland in its Sustainability report talks only about employees and sustainability measures for the building where the Commission headquarters of are located and nothing about other areas of the enterprise. Therefore, some SFEs (e.g. Lesy Ceske Republiky, ÖBF, Metsähallitus) applied the principle of *materiality* perfectly along with *completeness* of presented information; content of reports is well-developed, information is full and allows all aspects of SFE performance to be understood. Whereas other SFEs (e.g. Forest Commission Scotland, The State Forests National Forest Holding, LVM) still have problems in developing the reports, mainly in presenting information concerning all components of sustainable development.

Principles of report quality are better presented in reports. *Balance* is very important, it allows SFE development to be seen and how it is trying to rectify negative aspects of its performance. For this, a good practice is to set targets for enterprise development in different areas for the next 5-10 years and then report on the progress. This is a good tool to monitor enterprise progress and to report on it. This practice is used by Sveaskog, ÖBF, Metsähallitus. These SFEs with the help of targets show if they reached a set target for the year and if not explain why and what can be done to fix it in the next years. An important indicator for reporting is *comparability*. Without this, we cannot really understand the meaning of presented data. *Comparability* allows progress to be seen and compared. However, SFEs usually only compare data for the reported year with the previous one (e.g. Metsähallitus, LVM). In order to have a holistic picture of enterprise development this is not enough. A comparison should be made at least for three, or better five years. Good examples are Coillte and RMK, which present most common data for 5 consecutive years (e.g. profit, turnover, protected areas) and all other data only for the previous year. The level of *accuracy* is high in the analyzed reports. For CR reports, *clarity* is very important, because they are directed at the general public and need to be understood by everyone. Sveaskog, Coillte, Lesy Ceske Republiky, ÖBF, Metsähallitus and RMK reports are good examples of user-friendly reporting practices. They present data using tables, schemes, pictures, highlighting the most important facts. All of these reports also contain a financial part at the end with precise information about economic indicators. One of the main aims of reporting is to track the development of enterprises. For this, we need to have information on time in order to analyze it. All SFEs have the reports for 2015 on their websites. Swedish Sveaskog also publishes quarterly financial reports. The last indicator is *reliability.* It helps to improve trust between enterprise and stakeholders. Unfortunately, reports of Polish State Forests National Forest Holding, Sveaskog and Forest Commission Scotland Sustainability report do not have an external audit statement.

Table 2.5: Evaluation of SFEs reports (own elaboration)

Country, SFE	Name of the report	Report content						Report quality							
		Materiality	Stakeholder Inclusiveness	Sustainability Context			Completeness	Balance	Comparability	Accuracy	Timeliness	Clarity	Reliability	Score for a report	Average score
				Economic	Social	Environmental									
Sweden Sveaskog	Year-end report (Financial)	1	0	2	1	1	1	1	2	2	2	2	0	15	19.3
	Sveaskog in brief	2	2	2	2	2	2	2	1	2	2	2	0	21	
	Communication on progress (Sustainability)	2	2	2	2	2	2	2	2	2	2	2	0	22	
Poland The State Forests National Forest Holding (Lasy Panstwowe)	State Forest in Figures (environmental)	1	0	0	0	2	1	1	2	1	2	2	0	12	12
	Forests in Poland (environmental)	1	0	0	0	2	1	1	2	1	2	2	0	12	
Ireland Coillte	Coillte annual report	1	1	2	1	0	1	2	2	2	2	2	2	18	19.5
	Sustainability report	2	2	1	2	2	2	2	1	2	1	2	2	21	
Czech republic Lesy Ceske Republiky	Annual Report (Integrated)	2	2	2	2	2	2	2	2	2	2	2	2	24	24
Austria Österreichische Bundesforste AG (ÖBF)	Facts and figures (Sustainability)	2	1	2	1	2	2	2	2	2	2	2	2	22	22
Finland Metsähallitus	Metsähallitus` year and Corporate Social Responsibility in 2015	2	2	2	2	2	2	2	1	2	2	2	2	23	23
Estonia State Forest Management Centre (RMK)	RMK Annual Report	2	2	2	1	2	2	2	2	2	2	2	2	23	23
Latvia Latvijas valsts mezi (LVM)	Annual accounts (Financial)	1	1	2	1	0	2	2	1	2	1	2	2	17	17
Scotland Forestry Commission Scotland	Annual Sustainability Report 2014/2015	1	0	0	0	1	1	2	2	1	2	1	0	11	12.5
	Annual Report and Accounts 2014-15	1	0	2	1	0	1	1	2	1	2	1	2	14	

2.5.2. Assessment of sustainability metrics

2.5.2.1. Economic metrics

All companies prepare financial reports annually. Corporate accounting has been regulated in public companies for a long time; in the 1990s International Accounting Standards was introduced which led to further standardization of financial reports (Mikkilä and Toppinen, 2008). Therefore, the financial part of the analyzed reports is quite detailed. However, it is not comparable among SFEs. A lot of data is presented but it varies greatly from one SFE to another. There is often no connection between economic performance and its implications for sustainability. It would be useful to have economic indicators per forest area, per m^3 of harvested timber or per employee (e.g. profit per hectare, timber sales per hectare of productive forest etc.) in addition to the data in absolute terms. This would make a comparison easier and more obvious. Another suggestion would be to decrease the amount of economic data in sustainability/CR reports but make them consistent among all SFEs. For example, almost all SFEs report cash flow, profit, turnover, investments, net sale. Having few indicators but for all SFEs would give a clear picture of their performance rather than having many data that are not comparable.

2.5.2.2. Environmental metrics

Forest enterprises function within a vulnerable and important ecosystem, so their sustainable management performance is extremely important. Environmental indicators thus show an integral part of everyday performance and allow judging how responsible SFEs are. SFEs declare that they build their activity on the basis of sustainable development. They put their sustainability efforts into practice by placing equal value on protection of the environment, needs of society and commercial success. Among environmental activities, sustainable forest management (SFM) plays an important part. Indicators that can reveal this are annual increment and growing stock. However, only Metsähallitus and ÖBF report such important data. Some SFEs (RMK, The State Forests National Forest Holding) present a lot of data about tree cover, species and age structure of trees, different silviculture measures. For the same reason SFEs pay a lot of attention to the certification process within their activities. They report about certification of their timber and wood products by FSC, PEFC (Coillte (Ireland), Statskog (Norway)). Moreover, for some specific products they apply another type of certification, e.g. LVM (Latvia) is certified according to the international standard ISO 9001:2009 for production and sale of seedlings.

Apart from SFM practices, environmental metrics of SFEs also include other important environmental information such as biodiversity protection, waste management, and data about pollution, energy use, etc. This is explained by a good legislation system that obliged them to do this and the fact that their business activities are based on the use of forest materials. SFEs manage established protected areas and other areas reserved for conservation; create new ones; as well as take care of protection of endangered species; management of wilderness areas, recreational areas and other special areas. Some SFEs present not just general information like % of protected areas, but also number of protected species, biotopes, species habitats, and cost of nature protection works (e.g. RMK). A trend that is now quite common is to use different kinds of renewable energy sources or to implement measures for energy efficiency. Policy interest in energy security (The 2020 climate and energy package) and renewable energy sources, combined with relatively high oil and gas prices,

made this one of the most developing and promising fields. The use of renewable energy sources is enshrined in legally binding targets that have been set for each EU Member State concerning the role to be played by renewable energy sources through to 2020. Wood biomass, but recently also solar energy and hydropower are used as renewable energy sources by SFEs. Consequently, SFEs report on this. In line with this there is the topic of climate change and air pollution reported by Sveaskog, Lasy Panstwowe, Coillte, Lesy České republiky and Metsähallitus.

Environmental metrics of SFEs are quite strong, but like the economic ones, are not consistent among SFEs. Another weak point that was revealed by Székely and Knirsch (2005) in their study on CSR is that SFEs like other companies mainly focus on lagging indicators to manage their environmental impacts; they neglect leading indicators. Lagging indicators reflect outcomes and are reported after an impact occurs. Leading indicators track activities that occur before an impact, such as the number of audits performed and gaps identified. They reflect possible risks. Consequently, the use of leading indicators together with lagging can be very effective in risk prevention and performance improvement. However, few SFEs include leading indicators in their reports. A good example is Metsähallitus; it presents an implementation of effectiveness targets with their realization. This is a positive example of reporting practice that allows the SFE progress towards sustainable development to be tracked and encourages performing better.

2.5.2.3. Social metrics

SFEs actively report on the topic of social responsibility and their social metrics are quite diverse. Social metrics strongly influence the perception of different stakeholders, from the State itself to communities, customers etc. However, the difference in reporting practices is significant. For example, almost all SFEs state that their employees work in healthy conditions. But just a few SFEs present data on working conditions of employees, number of work-related injuries (Sveaskog, Coillte, Metsähallitus and ÖBF) etc. This is very important data, especially for a forest professional where the possibility of being injured is high. A good example is Swedish "Sveaskog". In its report, data are presented according to GRI (indicators such as Notified work-related injuries, Notified work-related injuries/1,000 average employees). Data are broken down into different categories such as general information about employees, relation between men's and women's salaries, number of permanent employees by region (market area), and breakdown of employees in the group, health and safety, training programmes. Instead, all other SFEs present data only on number of employees, quite often also gender ratio, age structure, salary information.

SFEs are trying to get involved in social life, get in touch with local stakeholders. Some SFEs therefore have programmes aiming to reach different social groups: tourists, NGOs, local communities, business partners (e.g., Coillte, Metsähallitus). However, these activities are not easily quantifiable. Some complex social programmes can have basic quantitative indicators such as number of visitors to the forest areas, but this information needs to be supported by qualitative analysis. Sveaskog presents a good example of dealing with this issue. Swedish enterprise has developed its own customer and supplier satisfaction index; it also provides stakeholder dialogues presenting an overview of the key issues for the ten principal stakeholders. These tools can be useful for other SFEs as a way to measure stakeholders' satisfaction, to inform them and obtain their feedback about cooperation.

Table 2.6: Sustainability metrics of SFEs` reports (own elaboration)

Country, SFE and data sources	Economic metrics	Environmental metrics	Social metrics
Sweden *Sveaskog* Year-end report 2015 Sveaskog in brief 2015 Communication on progress 2015 http://www.sveaskog.se/ [Cited 16 August 2016]	• Operating income • Net sales • Profit • Investing activities • Financing activities • Cash flow • Earnings per share	Sustainable forest management • Biodiversity • Protected areas • Total land area • Forest age classification • Timber extraction as proportion of net growth on managed land • Certification Energy • Delivery volume biofuel • Energy consumption • Emission to air Management of pollution • Climate effect Sustainability metrics by *Sveaskog* • Consideration areas • Natural value trees • Hauling damage *Sveaskog* index • Consideration Index • CO2 emissions tonnes per delivered thousand m ^{3} sub	Employment Number of employees • Age groups • Personnel categories • Trainings • Sickness and injuries • Salaries *Sveaskog* index - employment • Employee Motivation Index • Leadership Index • Contractor Satisfaction Index • felling • Contractor Satisfaction Index • silviculture • Gender balance *Sveaskog* index customers • Customer Satisfaction Index sawmill customers • Customer Satisfaction Index pulpwood customers • Customer Satisfaction Index biofuel customers • Supplier Satisfaction Index
Poland *Lasy Panstwowe - Directorate-General of The State Forest* State Forest in Figures, 2015 Forests in Poland, 2015 http://www.lasy.gov.pl/ [Cited 16 August 2016]		Sustainable forest management • Environmental functions (protective, social, productive) • Land use structure • Nature conservation (protected areas, national park, Natura 2000) • Forest resources • Artificial afforestation • Silviculture measures • Harvesting Management of pollution • Carbon sequestration • Threats from biotic/abiotic factors (pests, disease, fires, air pollution)	Employment • Number of employees • Structure • Research activities Corporate citizenship • Forest education • Tourism
Ireland *Coillte* Coillte annual report, 2015 Sustainability report 2013 http://www.coillte.ie/	• Turnover • Profit • Capital Expenditure	Sustainable forest management • Certification	Employment • Number of employees • Gender Balance • Age structure

[Cited 16 August 2016]	• Revenue • Profit and Loss Account • Balance Sheet • Cash Flows	• Biodiversity and nature conservation • Forest area Management of pollution • Air emission by type and weight • Waste Management • Water withdrawal M3/Year • Water discharge by quality Energy • Renewable energy • Energy savings	• Pension schemes • Staff costs • Training • Employee Development programme Health and safety • Occupational Diseases Rate • Accidents Corporate citizenship • Outdoor recreation • Supporting communities Stakeholder engagement • Public consultation • to deal with stakeholder complaints • Stakeholder newsletter
Czech republic *Lesy České republiky* Annual Report, 2015 http://www.lesycr.cz/ [Cited 17 August 2016]	• Revenue • Operational costs • Profit (loss) • Cash flow • Total costs • Investments	Sustainable forest management • Area of forestland • Surface area of stands • Logging • Reforestation • Tending of young forest stands • Share of Conifers and Deciduous Trees • Silviculture measures • Forest protection • Certification Management of pollution • Air pollution • Water management	Employment • Number of employees • Staff costs • Employee Education • Trade unions Stakeholder engagement • Communication with public • Cooperation with Non-Government Organizations
Austria *Österreichische Bundesforste (ÖBf)* Facts and figures, 2015 http://www.bundesforste.at/ [Cited 17 August 2016]	Financial performance • Sales revenues • Cash flow • Operating profit • Income statement • Return on sales • Investments Sustainability targets *ÖBf* • Total profit and loss • Operative cash flow • Return on sales (ROS) in own business • Satisfied customers	Sustainable forest management • Silviculture measures • Annual sustainable yield • Nature conservation measures • Forest area • Timber harvested Energy • Efficient use of energy • Renewable energy Sustainability targets *ÖBf* • Securing of forest utilization rights • Realization of specific protected forest projects • Quantitative sustainability (forest)	Employment • Amount of employees • Age structure • Gender ratio • Human resources strategy • Trainings Health and safety • Occupational Diseases Rate • Accidents Corporate citizenship • Recreation • research Sustainability targets *ÖBf* • Improvement of recreational function

	• Research and development	• Qualitative sustainability by the use of stands which are ready to harvest (= end use) • Qualitative sustainability of management actions with timber production • Achievement of stocking target • Targeted activities for the protection of nature/active ecosystem management	• Occupational safety • Employee satisfaction
Finland *Metsähallitus* Metsähallitus` year and Corporate Social Responsibility in 2015 http://www.metsa.fi/ [Cited 17 August 2016]	• Operating profit • Turnover • Profit • Investment • Business operations • Cash flow statement • Net sales	Sustainable forest management • Forest land • Growing stock • Multiple use of forest • Forest certification • Tree growth • Volume of felling • Biodiversity and natural protection • Certification Management of pollution • Water area • Climate change mitigation • Pollution Energy • Renewable energy • Efficient transport	Employment • Amount of employees • Age structure • Gender ratio • Salary • Trainings Health and safety • Occupational accidents Corporate citizenship • Cultural heritage • Tourism activity • Immigrant integration programme Stakeholder engagement • Customer satisfaction • Stakeholders communication • Volunteer work
Estonia *RMK* RMK Annual Report, 2015 https://www.rmk.ee/ [Cited 17 August 2016]	• Turnover • Profit • Proprietary income to the state • Net sale	Sustainable forest management • Forest land • Silviculture measures • Timber marketing • Certification • Forest reserves and protected areas, species • Cost of nature protection works Management of pollution • Waste collection	Employment • Number of employees • Age structure • Gender ratio • Salary • Research work Corporate citizenship • Nature education programme • Recreation • Nature observation • Heritage culture Stakeholder engagement • Cooperation projects • Forestry scholarships
Latvia *LATVIJAS VALSTS MEŽI (LVM)* Annual accounts, 2014 http://www.lvm.lv/ [Cited 17 August 2016]	• Expenses • Income • Profit • Profit • Cash Flow • Sales	Sustainable forest management • Protected habitats • Certification	Employment • Personnel costs • Number of employees Stakeholder engagement • Public relations projects and events

Scotland *Forestry Commission Scotland* Annual Sustainability Report 2014/2015 Annual Report and Accounts 2014-15 *http://scotland.forestry.gov.uk/* [Cited 17 August 2016]	• Income • Sale • Investments • Net expenditure • Assets • Cash flow • Taxpayers' Equity • Trade	Management of pollution • waste recording • reduced energy emission • reduced emission for travel • reduced water consumption Energy • energy efficiency surveys • ISO 14001	Employment •Support for staff •Gender ratio •Number of employees •Salary •Learning &Development Health and safety • Accidents • Health and safety statement • Sickness

2.6. Conclusions

The research has sought to analyze the reporting practice of SFEs in Europe. Reports are one of the most basic tools to communicate to the public SFEs' performances in different areas. A lot of SFEs are operating as profit companies, at the same time taking care of forest-based public goods. Thus, information SFEs provide in their annual reports is crucial for understanding if they follow sustainable forest management practices and principles of corporate responsibility.

One of the most visible conclusions of our analysis is that a majority of SFEs are not very effective in their disclosure services to the public. SFEs are not obliged to publish results of their activities following some consolidated reporting guidelines, nor to be audited by an external agency for the contents and structure of their reporting initiatives. Only one SFE is following GRI frameworks for presenting data (Sveaskog). Each enterprise therefore decides by itself how to proceed with reporting on its activities. The use by some SFEs only of the local language is a further barrier to widening the contents of their reporting activities to different stakeholders.

Analyzed reports contain a lot of data and information on a variety of activities and within different areas of enterprises. However, data are not always comparable at the scale of all SFEs in Europe. Among the main problems for enhancing SFEs transparency is the lack of a coordinated reporting framework or a minimum standard of indicators in common use. Comparability between SFEs is limited due to the different indicators, time frames and units of measure. The comparability of data would help to identify enterprises` strengths/weaknesses, exchange best practices and improve performances. In order to highlight long-term risks and opportunities for SFEs it would be useful to apply benchmarking methods (Vorhies and Morgan, 2005) and standard costs. Regularly published reports, audited externally, based on a common set of reporting criteria and meaningful indicators, would increase transparency and accountability and, in this way, public support and reputational values of these important players in the European forestry sector.

2.7. References

Baviera-Puig, A., Gómez-Navarro, T., García-Melón, M., García-Martínez, G., 2015. Assessing the communication quality of CSR reports. A case study on four Spanish food companies. Sustainability 7, 11010–11031. doi:10.3390/su70811010

Dawkins, J., 2004. Corporate responsibility: The communication challenge. J. Commun. Manag. 9, 108–119.

Du, S., Bhattacharya, C.B., Sen, S., 2010. Maximizing business returns to corporate social responsibility (CSR): The role of CSR communication. Int. J. Manag. Rev. 12, 8–19. doi:10.1111/j.1468-2370.2009.00276.x

European Commission, 2001. European Commission. Green Paper: Promoting a European Framework for Corporate Social Responsibility (COM 366), COM.

EUSTAFOR, 2016. Managing State Forests in Europe. Eur. State For. Assoc. 12.

FAO, 2010. Global Forest Resources Assessment : Socio-economic functions of forest resources.

GRI, 2014. G4 Sustainability Reporting Guidelines. Glob. Report. Initiat. 1–97.

Hickey, G.M., Innes, J.L., Kozak, R. a., Bull, G.Q., Vertinsky, I., 2006. Monitoring and information reporting for sustainable forest management: An inter-jurisdictional comparison of soft law standards. For. Policy Econ. 9, 297–315. doi:10.1016/j.forpol.2005.09.001

Isaksson, R., Steimle, U., 2009. What does GRI reporting tell us about corporate sustainability? TQM J. 21, 168–181. doi:10.1108/17542730910938155

Kim, H., Hur, W.M., Yeo, J., 2015. Corporate brand trust as a mediator in the relationship between consumer perception of CSR, corporate hypocrisy, and corporate reputation. Sustain. 7, 3683–3694. doi:10.3390/su7043683

KPMG, 2015. Currents of change: The KPMG Survey of Corporate Responsibility Reporting 2015 1–48.

Krott, M., Stevanov, M., 2008. Comprehensive comparison of state forest institutions by a causative benchmark-model. Ger. J. For. Res. 57–64.

Kubo, N., 2004. Public agency sustainability reporting. GRI 46.

Li, N., Toppinen, A., 2011. Corporate responsibility and sustainable competitive advantage in forest-based industry: Complementary or conflicting goals? For. Policy Econ. 13, 113–123. doi:10.1016/j.forpol.2010.06.002

Li, N., Toppinen, A., Tuppura, A., Puumalainen, K., Hujala, M., 2011. Determinants of Sustainability Disclosure in the Global Forest Industry. Electron. J. Bus. Ethics Organ. Stud. 16, 33–40.

Ligteringen, E., Arbex, N., 2011. GRI Sustainability Reporting: How valuable is the journey? GRI Learn. Ser. 1–60.

McDonald, G.T., Lane, M.B., 2004. Converging global indicators for sustainable forest management. For. Policy Econ. 6, 63–70. doi:10.1016/S1389-9341(02)00101-6

Mikkilä, M., Toppinen, A., 2008. Corporate responsibility reporting by large pulp and paper companies. For. Policy Econ. 10, 500–506. doi:10.1016/j.forpol.2008.05.002

Moneva, J.M., Archel, P., Correa, C., 2006. GRI and the camouflaging of corporate unsustainability. Account. Forum 30, 121–137. doi:10.1016/j.accfor.2006.02.001

Panwar, R., Rinne, T., Hansen, E., Heikki, J., 2006. Corporate responsibility balancing economic, environmental, and social issues in the forest products industry. For. Prod. J. 4–12.

PROFOR, 2005. Experiences and Lessons from Eastern Europe Europe and Central Asia Region.

Schmithüsen, F., Hirsch, F., 2010. Private Forest Ownership in Europe. United Nations, Geneva.

Skouloudis, A., Evangelinos, K., Kourmousis, F., 2010. Assessing non-financial reports according to the Global Reporting Initiative guidelines: evidence from Greece. J. Clean. Prod. 18, 426–438. doi:10.1016/j.jclepro.2009.11.015

Szczepankiewicz, E.I., Mućko, P., 2016. CSR reporting practices of polish energy and mining companies. Sustain. 8, 126, 17. doi:10.3390/su8020126

Székely, F., Knirsch, M., 2005. Responsible leadership and corporate social responsibility: Metrics for sustainable performance. Eur. Manag. J. 23, 628–647. doi:10.1016/j.emj.2005.10.009

Toppinen, A., Li, N., Tuppura, A., Xiong, Y., 2012. Corporate responsibility and strategic groups in the forest-based industry: exploratory analysis based on the Global Reporting Initiative (GRI) framework. Corp. Soc. Responsib. Environ. Manag. 19, 191–205. doi:10.1002/csr.256

Vidal, N.., Kozak, R.., 2008. The recent evolution of corporate responsibility practices in the forestry sector. Int. For. Rev. 10, 1–13. doi:10.1505/ifor.10.1.1

von Detten, R., Faber, F., 2013. Organizational decision-making by German state-owned forest companies concerning climate change adaptation measures. For. Policy Econ. 35, 57–65. doi:10.1016/j.forpol.2013.06.009

Vorhies, D.W., Morgan, N. a., 2005. Benchmarking marketing capabilities for sustainable competitive advantage. J. Mark. 69, 80–94. doi:10.1509/jmkg.69.1.80.55505

2.8. Reference list for SFEs` reports

Coillte, 2013. Coillte | Sustainability Report 2013. Available at: http://sustainabilityreport2013.coillte.ie/.

Coillte, 2016. Coillte Annual Report 2015. , p.104. Available at: http://www.coillte.ie/fileadmin/user_upload/pdfs/Annual_reports/Coillte_Annual_Report_2015_Web.pdf.

JOINT STOCK COMPANY " LATVIJAS VALSTS MEŽI " ANNUAL ACCOUNTS 2014, Riga. Available at: http://www.lvm.lv/images/lvm/Par_mums/EN/Finanses/ANNUAL_ACCOUNTS_2014.pdf.

Lesy České republiky, S.., 2015. Annual Report, Available at: http://www.lesycr.cz/o-nas/dokumenty-ke-stazeni/Documents/Lesy_Ceske_republiky_Annual_Report_2015.pdf.

Metsähallitus Group, 2016. Metsähallitus` year and Corporate Social Responsibility in 2015, Available at: http://julkaisut.metsa.fi/assets/pdf/mhtoimintakertomus2015eng.pdf.

Österreichische Bundesforste, 2015. Facts and Figures 2015, Available at: http://www.bundesforste.at/fileadmin/bundesforste/Zahlen___Fakten/2015/Facts_Figures_2015_FINAL.pdf.

RMK, 2016. Annual Report 2015, Available at: https://media.voog.com/0000/0004/9218/files/RMK_AR_ENG_2015_FINAL.pdf.

Sveaskog, Sveaskog in brief, Available at: http://www.sveaskog.se/Documents/Trycksaker/F%C3%B6retagsinformation/Sveaskog in brief.pdf.
Sveaskog, 2015. Year-end report 2015, Available at: http://www.sveaskog.se/Documents/Trycksaker/Finansiella Rapporter/Sveaskog Year End Report 2015.pdf.
SVEASKOG AB, 2015. Communication on Progress 2015, Available at: http://www.sveaskog.se/Documents/Trycksaker/F%C3%B6retagsinformation/Communication on Progress 2015.pdf.
The State Forests Information Centre, 2016. Forests in Poland 2015, Available at: http://www.lasy.gov.pl/informacje/publikacje/in-english/the-state-forests-in-figures/the-state-forests-in-figures-2015.

Chapter III

Article 2: Management Goals and Performance: Clustering State Forest Management Organizations in Europe with Multivariate Statistics

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3.1. Abstract

State Forest Management Organizations (SFMOs) play a crucial role in the European forest sector, managing almost half of the forests in the region. SFMOs are often only managed for timber production, whereas, being publicly owned, they should play an important role in providing a vast range of public goods (e.g., soil protection, biodiversity conservation). Their management goals depend on the history and current conditions of the forest sector at a national level, as well as different challenges and the potential for development. Although there is a lack of knowledge about the current performance of SFMOs, there have been recent changes to their management goals and practices in response to the new demands expressed by society (e.g., transparency, social inclusion). The main purpose of this study was to analyze the current situation of SFMOs by grouping them with the help of a Cluster Analysis according to indicators that reflect the three pillars of the common understanding of the sustainable forest management (SFM) concept. Additionally, in light of the differences in the forest practices and management priorities in each country, we used Principal Component Analysis (PCA) to group countries according to common characteristics of the forest sector at the national level. The results showed three main clusters of SFMOs in Europe. The first cluster had a rather small but commercially-oriented forestry unit together with other business activities and a strong focus on public services. The second focused on public interest, rather than commercially-oriented organizations. The third is mainly profit-seeking. The existence of diverse SFMO clusters shows the possibility of different approaches for SFM with a focus on different goals (e.g., profit gaining, public service delivery).

Keywords: state ownership, forest management, forest enterprise, public enterprise, cluster analysis, European forestry.

3.2. Introduction

State ownership appears to be a persistent characteristic of the economic forest landscape on a global scale (PricewaterhouseCoopers, 2015). A key role in managing state-owned resources is played by the so-called State-Owned Enterprises (SOEs). An SOE is a "firm that is (wholly or partially) owned and controlled by the state (government)" (Peng et al., 2016). The state exercises ownership over SOEs in the interests of the public. The main purpose of state ownership should be to maximize value for society through an efficient use of resources (OECD, 2005). For this reason,

the governance of SOEs is attracting increasing attention from citizens. In the last few decades, public control was increased by the spread of the principles of transparency and disclosure. These principles are even more important for SOEs than for other companies since it is important to show how public resources are used and distributed. Rising public scrutiny provides strong incentives for good governance. This kind of control can help SOEs to deal with the problems and criticisms usually associated with them (OECD, 2005). Among the most common problems of SOEs are (i) inefficiency; (ii) poor monitoring of managers; (iii) lack of market discipline; (iv) corruption; and (v) political interference (Belloc, 2014).

State forest ownership is strong in Europe. The statistics of the United Nations Economic Commission for Europe (UNECE) showed that, in 2010, forests in Europe (excluding Russian Federation, Ukraine, and Belarus, where almost 100% of forest is state-owned) were 61.6% privately owned and 38.4% state owned. In European forestry, sustainable forest management (SFM) has been a highly relevant topic since the 1990s. The principles defined in 1992 at the United Nations Conference on Environment and Development in Rio (United Nations, 1992) led to a precise definition of SFM. Besides a sustainable yield, the three pillars of economic, ecological, and social sustainability are expected to be on the forestry agenda (Wolfslehner and Vacik, 2008). These principles are embraced by the European Union (EU) Forest Strategy (2013) and are core guidelines for forest management in the EU. Later, widely-accepted concepts such as ecosystem services (Millennium Ecosystem Assessment, 2005) have forced State Forest Management Organizations (SFMOs) to rethink their management goals. SFMOs are defined as commercially-oriented state forest companies, enterprises, and agencies that have sustainable forest management and sustainable wood production as major concerns (EUSTAFOR, 2016). In this paper, we are using the term "State forest management organization (SFMOs)" due to our sample based on the European State Forest Association (EUSTAFOR) membership that includes different legal forms of state ownership (see Table 3.4 in Liubachyna et al. (2017), not just enterprises. However, as generally, in the literature on state ownership the term "State-owned enterprise" (SOEs) is preferred. Therefore, we keep this term only in discussing the theoretical background.

Because of their public nature, SFMOs are expected to have a special responsibility in guaranteeing SFM. They should find a balance between the different and sometimes competing priorities of the forest functions (social, economic, and environmental) in their management models in order to satisfy the respective requirements and reach the SFM goals. The forest sector in the EU generally has a significant influence on the aspects of SFM. It operates within vulnerable and valuable ecosystems, providing many necessary public goods such as biodiversity, cultural landscapes, good quality of water, air and soil, a stable climate, and resilience to fire and flooding (Cesaro et al., 2008). The sector also has a relevant role in the European economy and social development, and State-owned forests contribute to this role. Scholars (e.g., Levá et al., 2016; Kupčák, 2003; Konečný, 2014) specifically highlight the role of forests especially in rural development, mainly for their contribution to job opportunities and income in regions with high unemployment rates. Finally, European statistics show that forest-based industries represent about 7% of EU manufacturing Gross domestic product (GDP). In 2011, they had a combined production value of EUR 460 billion, with a total added value of EUR 135 billion on a turnover of EUR 485 billion (EC, 2012).

Despite the large share of state forest in Europe, its relative economic importance, and its high importance for many other different values, there is a gap in the scientific literature on the behavior

of the SFMOs/SOEs relative to SFM. The majority of recent studies on state ownership are focused on developing countries or countries in transition: China (Delang and Wang, 2013), Vietnam (World Bank, 2005a), Central and Eastern European Region (World Bank, 2005b), and just a few on EU countries: Germany (von Detten and Faber, 2013), United Kingdom (Ambrose-Oji et al., 2015), Czech Republic (Kupčák, 2005), and Lithuania (Brukas et al., 2011). Yet, there is still very little information about state forest ownership in today's markets, its current situation, challenges, or opportunities. The existing information is scarce and not systematically collected or analyzed (Liubachyna et al., 2017). The objective of this paper is therefore to present a first attempt at a comparative overview of SFMOs in the EU forest sector context. Specifically, we try to cluster SFMOs and to see how they balance their management and business activities between the three main pillars of sustainable forest management: ecological, economic, and social.

The article is structured as follows: the theoretical background of the study focuses on state ownership and specifically on state-owned forests (Section 3.3). After describing the research methodology (Section 3.4), an analysis and discussion of obtained SFMOs clusters are presented (Sections 3.5 and 3.6). The final part of the paper outlines the conclusions (Section 3.7).

3.3. Background

3.3.1. State ownership

The state sector has always been important in many economies, including the most advanced. Several socio-economic, political, and historical reasons explain why governments have established and maintain SOEs. One of the most common reasons for state ownership is natural monopoly. The state may be the appropriate monopolist in an economic sector where an interlocking supply network is required for the provision of goods or services. SOEs have also been established to carry out nationally strategic but risky or long-term investments where private sector investors were not available. Another common argument for SOEs is externalities. Private investors do not have the incentive to invest in public goods provided by forests without being paid for the service. SOEs can be created for the supply of goods or services which the private sector is not incentivized to supply. Lastly, the historical heritage and political ideology of countries can have a large influence on state ownership (European Commission, 2016; OECD, 2015; Kim and Chung, 2007; Chang, 2007).

Much of the literature tends to view SOEs as inefficient, bureaucratic entities that are poorly managed without coherence in their strategy and resource allocation decisions and, as a result, they are considered less efficient in state than in private hands (European Commission, 2016; Chang, 2007; Cuervo-Cazurra et al., 2014 and others). However, it is time to revise the role and management systems of SOEs, especially due to the intense changes that the state sector went through in 1980–1990 (OECD, 2005). These changes were mainly connected with a large wave of privatization in Europe. SOEs were found to be less productive than private enterprises, difficulties were detected in setting the objectives for SOEs and evaluating their performance, and there was a lack of commitment to good administration (Cuervo-Cazurra et al., 2014). Nevertheless, since the privatization wave, the direct role of the state in the economy has not completely lost its relevance: there are still a number of SOEs and the sector is remarkable for its size, economic impact, and the "strategic" (e.g., energy, transport) sectors in which it operates (OECD, 2005). At the same time, in many market economies, SOEs have undergone enormous changes stimulated by pro-market reforms. Globalization of the

financial markets and increased international trade also demanded that enterprises should be more free and flexible than what is usually possible in state ownership (OECD, 2005). It is important to remember that "SOEs are expected to fulfill special responsibilities and obligations for social and public policy purposes … (that) may go beyond the generally accepted norm for commercial activities" and disclosure of these "special obligations" should also increase the transparency of SOEs (OECD, 2010) (p. 26). The changes described above have stimulated the rise of new ideas for SOEs development.

3.3.2. SFMOs in the EU

The distribution of state forests and private forests in Europe varies a lot among countries. For instance, in countries like Austria, France, Norway, and Slovenia, private forests account for more than 75% of the total forest area in the country. Contrarily, Poland, Czech Republic, and Croatia only have 15–30% of private forests (EUROSTAT, 2011). Despite these differences, SFMOs have traditionally played a major role in the forest sector in European countries, justified by duties (tasks of forest authority and management), a large resource base, and significant relationships with key stakeholders (Krott and Stevanov, 2008). Almost all SFMOs in Europe are members of EUSTAFOR, an umbrella organization that represents commercially-oriented state forest companies, enterprises, and agencies. The main goal of EUSTAFOR is to support and strengthen state forest management organizations in Europe, in order to provide sustainable forest management by helping them to maintain and enhance their economically viable, socially beneficial, culturally valuable, and ecologically responsible practices (EUSTAFOR, 2016). The organization currently has 30 members in 22 European countries representing the majority of the EU countries, as well as Norway and Bosnia and Herzegovina. EUSTAFOR's members account for one third of the EU forest area, including the management of 13 million ha of protected areas. Their combined annual harvest amounts to approximately 123 million m^3 of round timber. Together, the members provide employment for more than 100,000 people (EUSTAFOR, 2016).

The European forest sector went through intense changes in 1980–1990. These changes were generated by the collapse of the communist system in Eastern Europe and followed the changes in the national economies (World Bank, 2005b; Schmithüsen and Hirsch, 2010). In the former socialist countries, a free timber market was formed and new models of ownership have caused changes in the state forest sector (Teder et al., 2015). One of the dominant ideas among forest institutions that decided to reform/reorganize was to separate policy, regulatory, enforcement, and management functions. In this case, a forest authority, as part of its enforcement functions, supervises how forests are managed, while actual management is undertaken by a separate and independent organization (World Bank, 2005b). There are, broadly, two directions for the development of state forest management organizations: towards either a commercial-oriented organization or delivering specific ecosystem services of public interest. Of course, many organizations integrate both of these goals in their development, and all organizations, nowadays, are expected to pursue the three pillars of sustainability (economic, environmental, and social).

Transition towards more competitive SFM is necessary for SFMOs. Forestry has large economic potential and many organizations therefore prefer to go for commercial activities in their development. For this reason, it is not surprising that one of the most dominant forms of management of state forests is the creation of a separate state enterprise. Many countries in Europe, like Estonia,

Ireland, and Austria, have created state enterprises for commercial purposes (Kant, 2009). Changes in the forest sector such as a decrease in timber prices and rising labor costs forced these organizations to undertake profound changes in their production processes. The main changes had a technological and organizational nature, like the mechanization of harvesting operations, personnel reduction, and outsourcing of some activities (Teder et al., 2015; Kubeczko et al., 2006). The success or failure of these organizations depends on many different factors such as the market situation and political reforms in the country or specifically in the forest sector, etc. For example, state forest enterprises in Latvia and Estonia have significantly increased their turnover and profit after reorganization. Contrarily, the Polish state forest enterprise has been in a difficult financial situation and has been unable to achieve economic returns similar to other state forest organizations (World Bank, 2005a). This can be explained by the fact that in some Eastern European countries, state forest authorities see themselves as the gatekeepers whose responsibility it is to ensure that intervention in forests is assessed from an ecological point of view (Kubeczko et al., 2006). In parallel to timber production, forestry, as a natural resource-based sector, allows new products and services to be developed for the support of sustainable development. It is important for an organization to define what these services and products are (or should be) in order to possibly reform its structure and to have clear objectives and targets. "Services" in the forest sector can be broadly defined to include services for the public good, as well as specific services to the forest industry (marketing assistance) or to private forest owners (extension services) (World Bank, 2005b). The emergence of new products has a potential role for employment in rural areas when a promotion of ecosystem services improves the environmental aspects of sustainability. Forestry is therefore one of the sectors that can ensure sustainability and quality of life through a combination of timber harvesting and the provision of public goods and activities (e.g., recreation) through the concept of forest multi-functionality. Sustainability is a matter of balancing these functions.

3.3.3. The forest sector at the national level

The extent and characteristics of state ownership can vary a lot depending on the country's history, its level of economic and institutional development, political system, macroeconomic situation, structural characteristics, comparative advantages, and access to various resources, as well as its integration with international trade and investment markets (Kowalski et al., 2013). In the same way, we can expect that how each SFMO is organized and managed is influenced by the specific conditions of the forest sector in the country.

3.4. Methods

For the purposes of this study, both primary and secondary data were collected and analyzed. In particular, sets of data were collected in the forest sector at a national and SFMO level. These data were processed with Principal Components Analysis (PCA), a statistical procedure used to analyze data by reducing the number of variables within the data to a limited number of linear combinations (linearly uncorrelated variables); each linear combination will correspond to a principal component (PC) (Joliffe and Morgan, 1992). A cluster analysis has been carried out to partition the observations into "distinct groups so that the observations within each group are quite similar to each other, while observations in different groups are quite different from each other" (James et al., 2013, p. 385), as explained in the following subsections.

All analysis was performed using RStudio (Version 1.1.383, R Studio, Inc., Boston, Massachusetts, USA), a software for statistical computing and graphics (www.rstudio.com).

3.4.1. Principal Components Analysis (PCA)

3.4.1.1. Countries dataset description

The cross-country dataset was built for 21 European countries, i.e., those with an SFMO member of EUSTAFOR: Austria, Belgium, Bulgaria, Croatia, Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Norway, Poland, Romania, Slovak Republic, Slovenia, Sweden, and the United Kingdom.

The dataset consisted of 14 quantitative variables and a qualitative variable that characterized and allowed a comparison of the forest sector at the national level (see Table 3.1). Due to data heterogeneity in the international databases, we used variables based on data availability and how recently the data was produced. The variables in existing databases were shown in various formats. To allow for comparison, the data were recalculated to relative values (e.g., Growing stock (million m^3) per ha of forest, Removals (m^3) per ha of forest (State Ownership)). Since the variables Annual work unit (AWU) and Fellings had some missing values, the R studio package MICE was used for the estimation of these gaps. The missing values represent 20% of observations for AWU and Fellings. The MICE algorithm implements a multiple imputation that uses Fully Conditional Specification (FCS), as described in (Buuren and Groothuis-Oudshoorn, 2011). Moreover, to create the variable Main Function, we assume that if a forest function is missing, its value is zero.

Table 3.1: Summary statistics (own elaboration)

Variables	Median	Mean	Std. dev	Description	Reference year	Source
AWU	5.00	4.97	2.82	Annual work units per 1 000 hectares	2010	Eurostat (online data codes: for_AWU and forest_area), FAO Forest Resources Assessment
PF_forests	60.00	52.95	26.66	Production function for all forest area (%)	2010	Global Forest Resources Assessment 2010 (FRA 2010)
Fellings	62.16	63.54	17.65	Fellings as percent of net annual increment (%)	2010	FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators
ln_GDP	10.09	10.14	0.71	Log GDP per capita (current US$)	Average 2010 – 2011	World Development Indicators
AgVA	2.13	2.72	1.60	Agriculture, value added (% of GDP)	Average 2010 - 2011	World Development Indicators
FS_Emp	1.40	1.55	0.88	Forestry sector employment as a proportion of total labor force	2011	FAO, Contribution of the forest sector to national economies
State_for	49.40	48.07	21.14	State and public forest, ha or %	2010	Eurostat
Priv_for	50.60	51.93	21.14	Private forest, ha or %	2010	Eurostat

GS_ha	19.76	20.00	7.33	Growing stock (million m^3) per ha of forest	2010	FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators and EUROSTAT
GS_ha_w	23.54	22.94	7.75	Growing stock per ha of forest for wood supply	2010	FOREST EUROPE/UNECE/FAO enquiry on pan-European quantitative indicators and EUROSTAT
Forest_protect	17.00	16.81	13.97	Forest within protected areas, % FRA2010	2010	Global Forest Resources Assessment 2010 (FRA 2010)
Removals_State	1.13	1.47	1.38	Removals (m^3) per ha of forest (State Ownership)	2010	Eurostat
Removals_State_w	1.43	1.67	1.53	Removals (m^3) per ha of forest for wood (State Ownership)	2010	Eurostat
Removals_Priv	1.67	1.89	1.31	Removals (m^3) per ha of forest (Private + Others)	2010	Eurostat
Removals_Priv_w	1.86	2.13	1.40	Removals (m^3) per ha of forest for wood (Private + Others)	2010	Eurostat
Forest_on_land	34.31	37.58	16.60	Forest area (% of land area)	Average 2010 - 2011	World Development Indicators
ln_Forest_Area	8.12	8.31	1.05	Log of Total forest area (000 hectares)	2010	Eurostat
Main Function (Qualitative Variable)	(1)			Primary designated functions of forest	2010	FAO, Global Forest Resources Assessment 2010

Production—15; Multiple Use—4; Conservation of biodiversity—1; None or unknown-1.

Note: data accessed by source websites on March 2017

3.4.1.2. Countries data analysis - PCA

Collected data for countries was further processed with the help of PCA. The data analysis consisted of two steps: Analysis of correlation and PCA.

Analysis of correlation (see Figure 3.1) is essential to interpret non-causal relationships among variables, considering the sample of countries in the study. The correlations are very helpful when interpreting the clusters by using PCA.

The PCA was performed with the objective of reducing the number of variables that characterize observations by synthetizing them into new variables (principal components) with further interpretation (Stevens, 2009). The PCA allowed us to rank the contribution of each variable to the components (see Table 3.2). Table 3.2 shows which variables determine the location of

observations on the four quadrants of the PCA graphs (Figure 3.2 and Figure 3.3) and allows interpretation of the first three principal components (PC). The score of each observation for each component (from "−4" to "4" on the vertical and horizontal axis) showed the similarity among these observations (see Figure 3.2 and Figure 3.3). Considering the whole countries dataset, the variance explained by the first three principal components represented 70% of the variability of the full system and was considered sufficient to explain differences among observations.

Figure 3.1: Correlation among quantitative variables
(Blue color means there is a positive correlation; red means a negative correlation. The darker the color, the stronger the correlation. White square means there is no significant correlation).

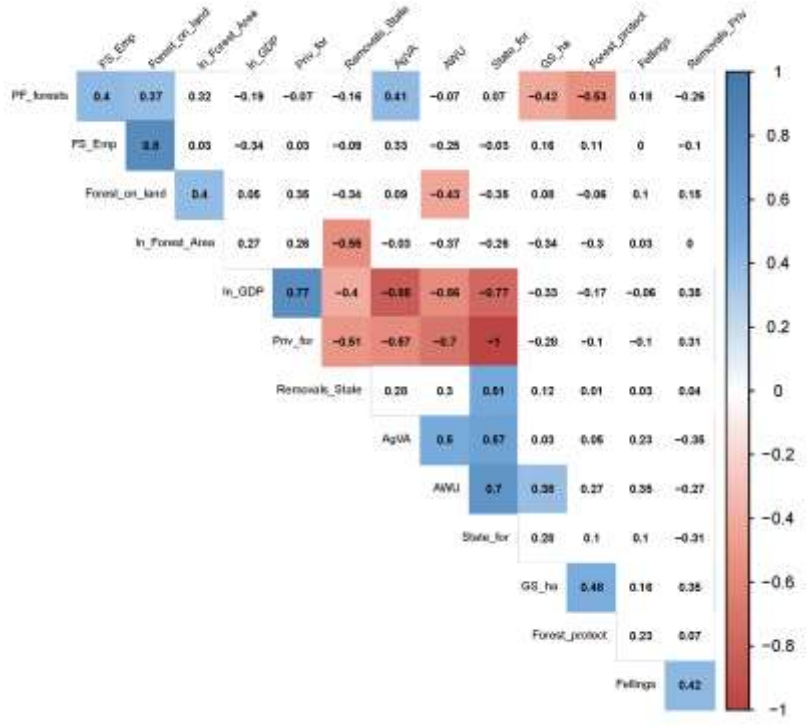


Table 3.2: **Contribution of each variable to the first three principal components in percentage (own elaboration).**

Variables	Principal Component 1 Socio-Economic Conditions and Ownership	Principal Component 2 Production Value of the Forest Sector	Principal Component 3 Forest Sector Conditions
AWU	14.54	0.87	0.01
PF_forests	0.00	26.20	1.50
Fellings	0.66	0.01	9.61
ln_GDP	15.98	4.62	0.80
AgVA	10.21	11.61	0.20
FS_Emp	0.00	16.56	15.60
State_for	18.28	0.21	0.75
Priv_for	18.28	0.21	0.75
GS_ha	3.03	4.18	23.22
Forest_protect	1.47	5.57	16.64
Removals_State	7.52	1.88	0.61
Removals_Priv	2.14	5.42	13.02
Forest_on_land	3.09	14.76	16.82
ln_Forest_Area	4.80	7.89	0.45

3.4.2. SFMOs analysis

3.4.2.1. Set of indicators

The chosen indicators aimed to reflect the three pillars of the SFM concept: economic, ecological, and social. The indicators are appropriate for the level of analysis of the actual organizational unit of forest management (i.e., single SFMO), where the forest management is taking place (Jöbstl, 2008). The selected indicators had to respect the following criteria: (i) be fact based; (ii) be based on available data for all SFMOs; (iii) be easily interpreted. In creating the final list of indicators, we both adapted indicators proposed by existing initiatives (e.g., GRI, 2014) and created new ad hoc indicators. One of the ad hoc indicators was, for example, "Labor productivity, Employees/1000 ha". With the help of this indicator, we aimed to assess whether the SFMO re-organized itself through reducing the number of employees and/or outsourcing some of the forest management activities. Another indicator was "Availability of reports in English (yes/no)". This indicator was created in light of the growing importance of the principles of transparency and disclosure of information by SFMOs. The opportunity to monitor the performance of organizations is crucial for the implementation of the principles of sustainability. In addition, the availability of information in English allows effective communication of information to all concerned parties.

Forest management indicators are essential for an organization that performs its activities within a forest ecosystem to retrieve and evaluate data about effects of forest management. Therefore, we placed indicators related to forest resources into a separate group.

Guaranteeing adequate forest resources to provide social, economic, and environmental functions for future generations is essential for sustainable development. Knowledge on how and why a forest area changes over time is essential for managing forests sustainably because such changes may result in long-term losses (FAO, 2015). Environmental protection indicators represent SFMOs' contribution to conservation and sustainable management of resources in the area. Indicators about financial aspects represent the financial viability of SFMOs. This component is one of the main targets for the organization and is compulsory for the achievement of other goals. Indicators about social responsibility and public relations aspects aim to represent a contribution to local livelihood and communities by SFMOs, as well as to indicate the level of transparency.

3.4.2.2. Data collection - SFMOs

In this study, we focus on members of EUSTAFOR (see Table 3.3). The paper does not cover all members of the association, but only those who responded to our questionnaire. The responding organizations (15 SFMOs out of 30, i.e., 50% response rate) represent a broad diversity of SFMOs in Europe.

Table 3.3: Selected data concerning analysed SFMOs (own elaboration)

SFMO (Country)	Area of enterprise, 1000 ha	Forest area, 1000 ha	Timber sell, m^3/ha	Forest management fee, % from turnover	% of state forest to total forest cover	Harvesting level/ Net annual increment (NAI), %
ÖBF (Austria)	850	510	3.6	12.6	13.1	22.8
Hrvatske šume(Croatia)	2019	2019	2.6	3.5	77.0	98.5

LSR (Czech Republic)	1284	1284	6.1	51.7	48.3	70.7
RMK (Estonia)	1209	904.7	4.6	11.7	40.8	82.0
Metsähallitus (Finland)	12538	9100	1.7	34.8	37.9	50.3
ONF (France)	1700	1500	7.5	-15.5	9.4	66.7
Landesbetrieb ForstBW (Germany)	325.3	306.7	6.9	14.9	2.8	98.5
Landesforst Mecklenburg-Vorpommern (Germany)	190	180	5.2	12.6	1.6	66.7
Coillte (Ireland)	445	410	4.7	1.2	55.5	123.3
Veneto Agricoltura (Italy)	8	5.8	1.6	0.0	0.1	32.9
Directorate General of State Forests (Lithuania)	1040.7	974	4.7	17.9	45.1	56.9
Statskog (Norway)	5900	1007	0.8	14.6	9.8	50.3
The State Forests National Forest Holding (Poland)	7603.8	7292.8	5.4	15.8	78.1	82.0
Romsilva (Romania)	3215.8	3108.9	3.9	6.4	47.3	36.4
LESY Slovenskej republiky (Slovakia)	898.7	898.7	6.0	2.4	46.5	70.7

Data on the management of selected SFMOs were obtained from publicly accessible data, namely financial statements (balance sheets, income statements), annual reports, corporate responsibility (CR)/sustainability/integrated reports, official web-pages, etc., and through the questionnaire. The questionnaire was based on a chosen set of indicators, open questions (e.g., a question about the main non-wood-production-oriented activities in order to have an initial idea of the main diversification strategy and goals adopted by the SFMOs), and a voluntary comments section. The questionnaires were prefilled with available data from publicly accessible sources. The data enquiry was for the time period of 2013–2015. During the first phase, the EUSTAFOR central office sent the questionnaire to members covering 20 countries and 33 SFMOs through the internal mailing list, followed by two reminders. During the second phase, we contacted SFMOs that had not responded through their official emails with the help of local experts (mainly scientists). The data were collected between December 2016 and March 2017.

3.4.2.3. SFMOs data analysis - Cluster analysis

A cluster analysis based on 29 variables, was used to analyze SFMOs (see Table 3.4). Since some variables had missing values, the R studio package MICE was used for the estimation of these gaps. We decided to use hierarchical cluster analysis instead of PCA because there are more variables than observations (Anderberg, 2014).

Table 3.4: List of indicators for cluster analysis and their basic statistical values (own elaboration)

Indicators Category	Indicators	Median	Mean	SEM	CI (0.95) Mean	Var	SD	CV
Economic	Profit/assets	2.8	2.9	0.7	1.4	6.4	2.5	0.9
	Expenditure for services per ha of land	105.4	168.2	53.1	114.0	42,350.9	205.8	1.2
	Timber sell per ha of forest	168.8	161.7	32.3	69.3	15,665.8	125.2	0.8
	Timber sell per ha of total forest area, m^3/ha	3.8	3.7	0.5	1.1	4.2	2.0	0.6
	Profit per ha of total forest area	9.6	27.1	10.5	22.5	1647.5	40.6	1.5
	Profit/turnover	9.0	12.2	2.8	6.1	120.2	11.0	0.9

	Investment in forest management, euros per ha of total forest area	20.6	29.5	10.5	22.6	1669.4	40.9	1.4
	Distribution of reinvestment in forest management, %	12.3	14.6	3.2	6.9	157.5	12.5	0.9
	Money paid to the state budget (forest management fee), %	12.6	13.6	3.6	7.6	189.4	13.8	1.0
	Existence of risk strategy or risk policy (yes/no)	1.0	0.7	0.1	0.3	0.2	0.5	0.7
	Market share of the national supply of industrial round wood, % (range from 1 to 4)	2.0	2.5	0.3	0.7	1.7	1.3	0.5
Forest management	Hunting activities (yes/no)	1.0	0.8	0.1	0.2	0.2	0.4	0.5
	Ratio of state forest to total forest cover, %	40.8	34.2	6.8	14.6	698.5	26.4	0.8
	Growing stock per ha of production forest (m^3/ha)	256.8	244.3	23.3	50.0	8160.1	90.3	0.4
	Ratio of production forest to total area of SFMO, %	74.8	70.1	6.8	14.6	696.4	26.4	0.4
	Certified forest, %	100.0	94.5	3.9	8.3	224.4	15.0	0.2
	Ratio of SFMO roundwood removals to country roundwood removals, %	35.2	29.8	7.4	15.8	815.0	28.5	1.0
	Harvesting level/NAI, %	66.7	67.3	7.0	15.1	739.6	27.2	0.4
	Comparison of Net annual increment of SFMO to country, %	0.0	−0.5	0.3	0.7	1.6	1.3	−2.4
	Forest damaged area, % (range from 1 to 4)	1.0	1.7	0.3	0.5	1.0	1.0	0.6
	Sawmills (yes/no)	0.0	0.1	0.1	0.2	0.1	0.4	2.6
Environmental protection	Protected forest, %	8.1	19.5	5.2	11.2	406.1	20.2	1.0
	Protected area, %	22.2	26.4	5.2	11.2	409.9	20.2	0.8
Social responsibility and public relations	Labour productivity, Employees/1000 ha	3.5	3.5	0.7	1.6	8.1	2.8	0.8
	Labour productivity, m^3/ha	3.9	3.6	0.5	1.1	3.9	2.0	0.5
	Gender ratio, %	18.8	23.1	2.4	5.1	84.9	9.2	0.4
	Tourism activities. (yes/no)	1.0	0.9	0.1	0.1	0.1	0.3	0.3
	Free access to non-wood forest products for population (yes/no)	1.0	0.9	0.1	0.1	0.1	0.3	0.3
	Availability of reports in English (yes/no)	1.0	0.5	0.1	0.3	0.3	0.5	1.0

SEM: Standard Error Mean; CI: Confidence Intervals; Var: Variance; SD: Standard Deviation; CV: Coefficient of Variation

Initially, each SFMO was a single cluster and then the algorithm proceeded iteratively joining at each stage the two most similar clusters until a single cluster was obtained. To measure the dissimilarity among the observations, we used the Ward method (Anderberg, 2014). The Ward's minimum variance method allows the creation of a cluster at each step by including in it the SFMO that leads to the minimum increase in the intra-cluster variance after its merging in the cluster. The initial distance between SFMOs is defined by the squared Euclidean distance. We drew conclusions about the similarity of two observations based on the location on the vertical axis where branches containing those two observations are first merged. As we move up the dendrogram, some objects were merged as an effect of objects that were similar to each other. The earlier (lower in the dendrogram) the merging occurred, the more similar the clusters of observations were to each other (James et al., 2013). The height of the merging was measured on the vertical axis, indicating how different the two SFMOs are. Thus, SFMOs that merged at the bottom of the diagram were very similar to each other, whereas SFMOs that merged at the top of the diagram were very different.

In order to give robustness to the decision about the number of clusters in the dendrogram, we considered a gap statistic (Tibshirani et al., 2001). This is an algorithm that compares the change in

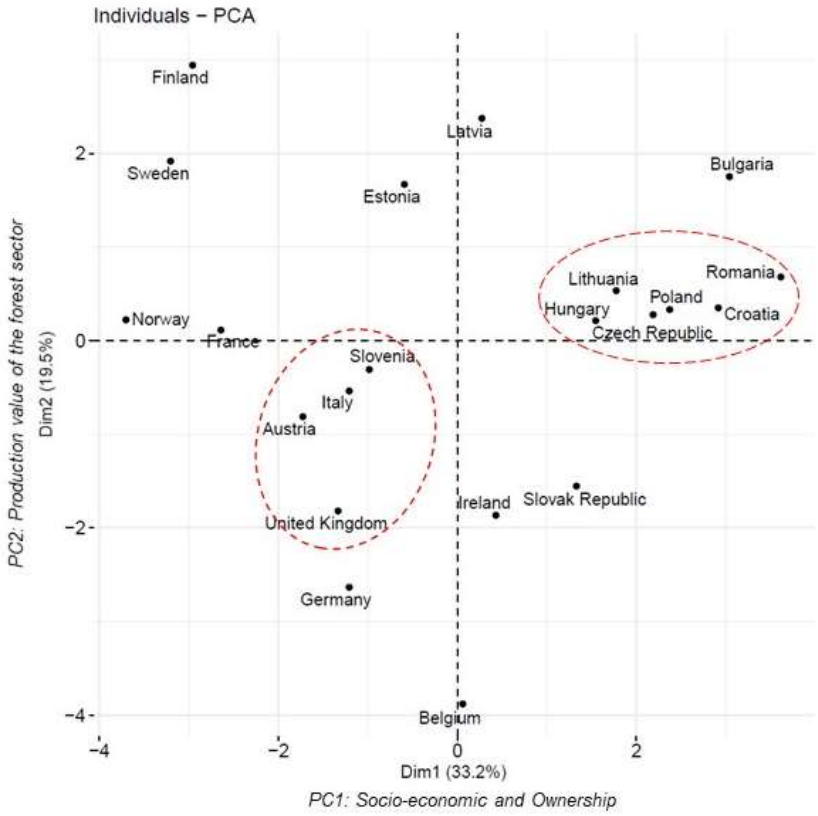
within-cluster dispersion (within intra-cluster variation for a given k cluster is the total within sum of square) with the expected value under the null hypothesis (no clustering). The higher the Gap statistic value, the better the clustering. This analysis showed that the best clustering in our dataset was given by six units.

3.5. Results

3.5.1. Principal Components Analysis (PCA)

In this study, we obtained three principal components (PC) (see Table 3.2) that distinguished different groups of European countries, which we can observe on the four quadrants of the PCA graphs (see Figure 3.2 and Figure 3.3) in terms of similarities in the forest sector at a national level with respect to the selected indicators).

Figure 3.2: Countries score for the first and second PCs



Principal Component 1 (PC1): Socio-economic conditions and Ownership. The most influential variables are the economic ones related to the public forest sector: ownership of forests (private and public are the reciprocal of one another), GDP per capita, Annual Working Unit (AWU) in forestry, removals from State, and Agricultural Value Added on total GDP (see Table 3.2).

The Socio-economic and Ownership component is influential in eastern European countries with a lower GDP per capita, a presence of state ownership in the forest sector (more than 40%), and

a higher number of AWUs. We can see these countries on the right-hand side of the graphs presented in Figure 3.2 and Figure 3.3. Ireland and Belgium are positioned slightly to the right of center on the graphs as they have a high GDP per capita but also a high level of state forest ownership. Like Belgium and Ireland, Germany also has a high level of state forest land compared to other western European countries and a high GDP per capita, but it is on the left part of the graph for the first component since the AWU is lower than the average. Two other variables with an influence on PC1 (removals from State, Agricultural Value Added on total GDP) have a positive correlation with a variable of state forest (%), with values of 0.51 and 0.57, respectively (see Figure 3.1). They therefore pull eastern European countries with high values for these variables to the right of the graphs.

Principal Component 2 (PC2): Production value of the forest sector. The most influential variables are the production function for all forest area, the percentage of employment in forestry compared to all economic sectors, the percentage of forest on total land, and Agricultural Value Added on total GDP (see Table 3.2).

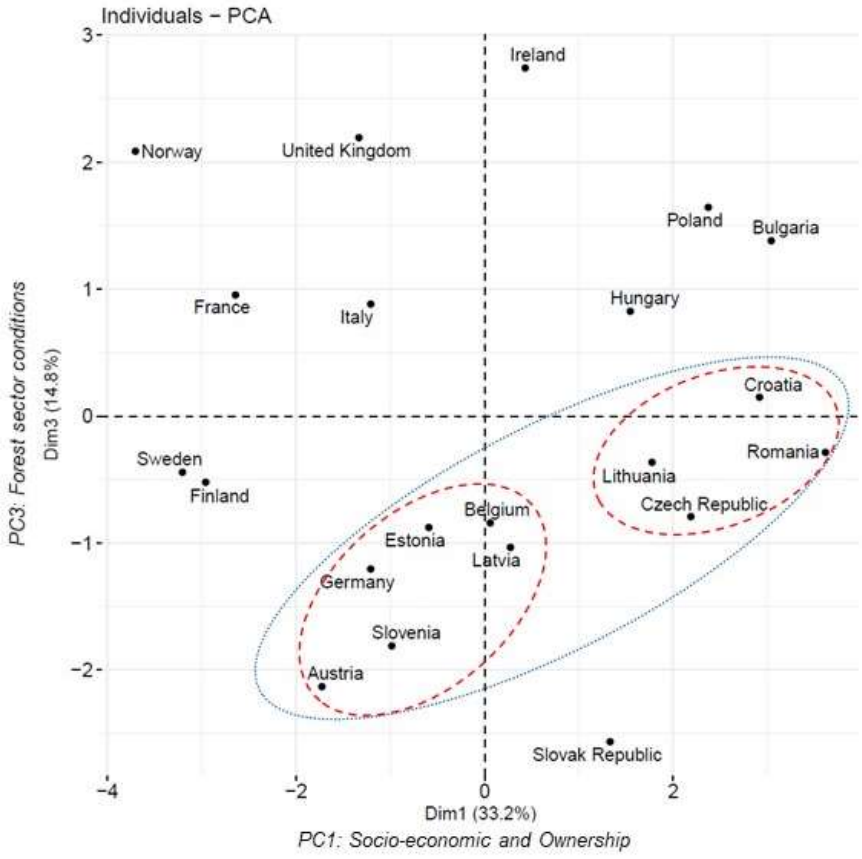
For the component of Production value of the forest sector, countries with the most productive forest management systems are in the upper part of Figure 3.2, i.e., eastern and central European countries, as well as Finland, Sweden, Norway, and France. The variables "percentage of employment in forestry compared to all economic sectors" and "percentage of forest on total land" have a strong positive relationship (R = 0.8). Therefore, we can see on the left graph the range of countries from Finland with a high level of forest land (73%) and high level of forest sector employment (2.8% with a mean of 1.55%), to Belgium at the bottom with a low level of forest land (22.5%) and low level of forest sector employment (0.6%). The variable of production function for all forest area has a positive correlation with other variables that comprise PC2, but the correlation shows a weak relationship (R ≈ 0.38) (see Figure 3.1). The patterns are therefore not that clear.

In Figure 3.2, we can distinguish two groups of countries that have quite similar characteristics. The first is represented by Lithuania, Romania, Poland, Hungary, Croatia, and the Czech Republic. They have a high percentage of state forestland, quite high level of forest productivity, and low GDP per capita compared to other countries in the analysis. The second group is composed of Slovenia, Italy, Austria, and the United Kingdom. They have a low level of state forest ownership (circa 20–30%), average or lower than average productivity, and medium level of GDP per capita.

Principal Component 3 (PC3): Forest sector conditions. The most influential variables are the growing stock, percentage of forest on total land, percentage of forest within protected areas and percentage of employment in forestry compared to all economic sectors, Removals of forest (Private + Others), and Fellings as a percentage of Net annual increment (see Table 3.2).

The variables contributing most to PC3 are not well correlated. Nevertheless, we can distinguish one large group for this component that is spread along the vertical axis with values from 0.1 to −2.2 (see Figure 3.3, blue ellipse). The forest sectors of these countries have a high value for growing stock and high percentage of forest within protected areas; indeed, these variables have a moderate positive relationship (R = 0.48). If we also consider PC1, this group can be split into two for the variable of forest ownership (see Figure 3.3, red ellipses) (group 1: Romania, Lithuania, Croatia, and the Czech Republic; group 2: Belgium, Estonia, Latvia, Germany, Slovenia, and Austria).

Figure 3.3: Countries score for the first and third PCs



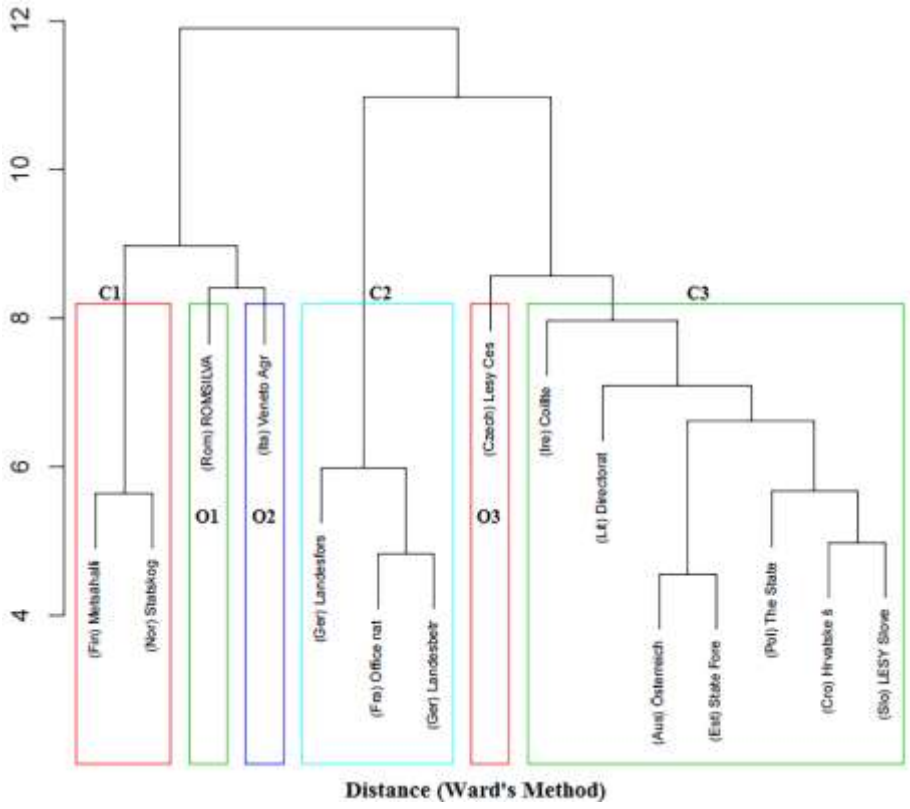
3.5.2. SFMOs clusters and outliers

With the cluster analysis, we obtained three clusters (C1, C2, C3) of SFMOs in the EU and three outliers (O1, O2, O3) that are fused rather arbitrarily at much higher distances and do not fit into the analysis clusters (see Figure 3.4). Each cluster has some particular characteristics that distinguish it from the others. Therefore, first we will describe three clusters and try to see which indicators have influenced the formation of these clusters. Next, we look at three outliers as their absence from the group is explained not by data anomalies, but by different values of indicators. Although outliers do not represent a typical SFMO, it is worth looking into them in more depth as they can provide useful insights into typical management practices that influence performance, either positively or negatively.

Cluster 1 (C1) is composed of two Nordic countries SFMOs: Statskog (Namsos, Norway) and Metsähallitus (Vantaa, Finland). Both countries are dominated by boreal forest, the state owns large areas (Metsähallitus owns a total area of 12,538 thousand ha of which the total forest area is 9,100 thousand ha while Statskog owns a total area of 5,900 thousand ha of which the total forest area is 1,007 thousand ha, average in the sample—total: 2,615 thousand ha, forested: 1,966 thousand ha), and the majority of their managed land area is not productive forest (only 8% of Statskog land is productive forest and 28% for Metsähallitus in comparison to total area of SFMO). Another similarity is that they are relatively small players in the forest economy of their countries.

In addition to timber production, both use resources for the development of new business activities (such as renewable energy, real estate, etc.) (see Table 3.5). Institutionally, they place a strong emphasis on incorporating social and environmental values into management systems and on the concept of forest multi-functionality (Metsähallitus Group, 2016). The social and environmental emphasis can be seen in the organizational structure of corresponding SFMOs. Metsähallitus comprises the Business Unit (Forestry, Laatumaa, and three subsidiaries) and Parks & Wildlife Finland, which attends to public administration duties. The number of visitors to Finland's national parks continues to increase and their economic impact on local businesses grew by nearly 13% in one year from 2014 to 2015 (Metsähallitus Group, 2016). Statskog, together with commercial activities such as property, energy, and forestry, has activities devoted specifically to outdoor life ("Statskog,").

Figure 3.4: Cluster analysis of SFMOs[13]



Cluster 2 (C2) is composed of three SFMOs: Landesbetrieb ForstBW (Germany), Office National des Forêts (ONF) (France) and Landesforst Mecklenburg-Vorpommern (Germany). All SFMOs have a very high amount of production forest (in Germany more than 90%). At the same time, three of them have the lowest numbers by indicator "profit/assets" (ONF: 0.07; Landesbetrieb ForstBW:−0.39; Landesforst Mecklenburg-Vorpommern: 0.34; in average in the sample: 2.89). In addition, the indicator of labor productivity (employees/1000 ha) in C2 is very different from other SFMOs (see Figure 3.5). The number of employees per 1000 ha in these SFMOs is much higher than

[13] The colours have been used to allow for easier identification of the clusters

in others (e.g., in ONF it is six employees per 1000 ha, in Landesbetrieb ForstBW—11 employees per 1000 ha when an average in the sample—3.5 employees per 1000 ha).

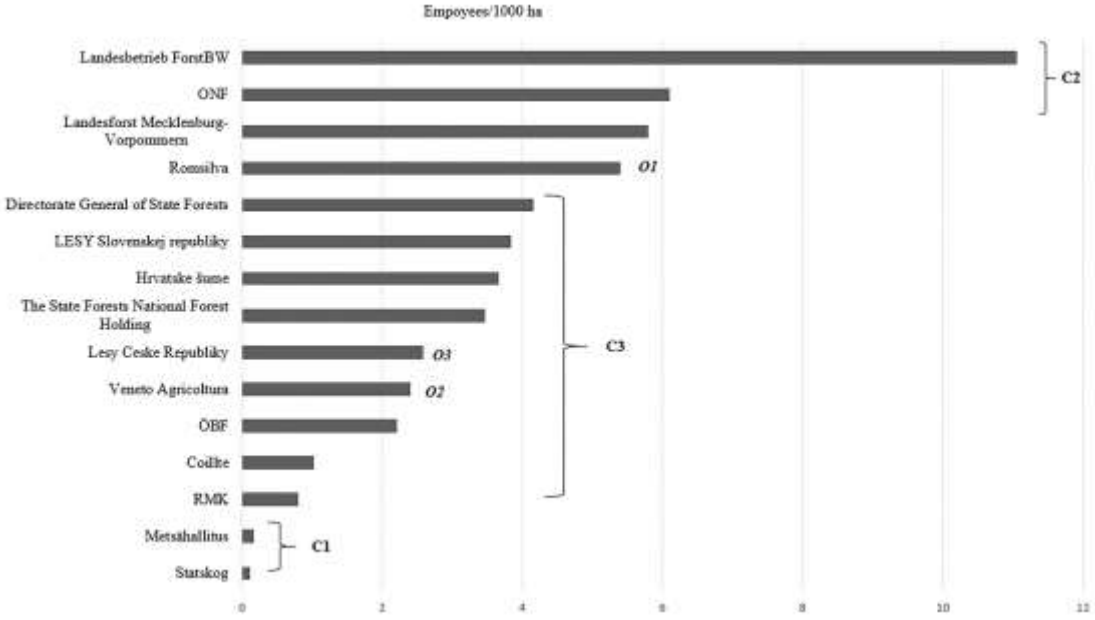
Table 3.5: Non-wood business activities of SFMOs (own elaboration)

SFMO (Country)	Nurseries	Renewable energy	Real estate/Land	Extraction of natural recourses	Recreation	Fishing	Game	Consulting	Other
ÖBF (Austria)		X	X	X	X	X	X	X	Wild Media (video and photo shooting)
Hrvatske šume(Croatia)	X	X		X	X		X	X	Horticulture
LSR (Czech Republic)	X			X		X	X		
RMK (Estonia)	X						X		The Põlula Fish Farm; Christmas trees sale
Metsähallitus (Finland)	X		X	X		X	X		
ONF (France)	X	X	X		X	X	X	X	Daycares for municipalities
Landesbetrieb ForstBW(Germany)	X	X	X			X	X		
Landesforst Mecklenburg-Vorpommern (Germany)	X		X		X		X	X	Ecopoints
Coillte (Ireland)	X	X	X		X			X	Panels production (MEDITE SMARTPLY)
Veneto Agricoltura (Italy)		X	X		X				
Directorate General of State Forests (Lithuania)	X						X		Timber transportation
Statskog (Norway)		X	X		X	X	X		
The State Forests National Forest Holding (Poland)	X			X	X	X			
ROMSILVA (Romania)	X		X	X		X	X		Breeding of pure-breds horses
LESY Slovenskej republiky (Slovakia)	X		X	X	X	X	X	X	

Cluster 3 (C3) is the biggest one and includes several cases, i.e., six SFMOs from six countries: LESY Slovenskej republiky (Banská Bystrica, Slovakia); Croatian Forests (Hrvatske šume) Ltd. (Zagreb, Croatia); The State Forests National Forest Holding (Raszyn, Poland); State Forest Management Centre (RMK) (Tallinn, Estonia); Austrian Federal Forests (ÖBF) (Vienna, Austria);

Directorate General of State Forests (DGST) (Vilnius, Lithuania); Coillte (Dublin, Ireland). LESY Slovenskej republiky (Slovakia) and Hrvatske Šume Ltd. (Croatia) converge inside C3 with a rather low height on the vertical axis, which shows their similarity. Indeed, many of the indicators for these SFMOs are quite similar, such as profit per ha of forest, forest management fee, and labor productivity. At the next step, the previous two SFMOs are merged with Polish State Forests National Forest Holding. It manages a bigger area than other SFMOs in C3 and it dominates in the forest sector of its country (only around 16–18% of forest is privately owned) (Brukas and Weber, 2009). In the next step, another convergence composed of Estonian RMK and Austrian ÖBF emerges. ÖBF is not a big player in its country but operates in highly competitive markets with private forest owners (around 74%), and has been forced to adopt institutional reforms in response. ÖBF is actively developing new business areas in its portfolio (e.g., real estate, consulting, renewable energy) (see Table 3.5). Instead, RMK is operating in a vastly expanding market, in which private forest owners are also dominant (61%) but still maintain significant market shares (World Bank, 2005b). The Directorate General of State Forests (DGSF) (Lithuania) joined the cluster during the next step. The focus of this SFMO is clearly timber production; however, the efficiency compared to other SFMOs might be not at the highest level. Although they outsource quite a lot of activities, the indicator of labor productivity (see Figure 3.5) is the highest in the C3 (around four employees per 1000 ha, average in C3—2.6 employees per 1000 ha). The last SFMO to join C3 is Coillte (Ireland). By any standard, Ireland is poorly endowed with forests, and forestry contributes only minimally to GDP. However, in the last century, the area of forests in Ireland has increased from 1% to around 10%. Coillte has basically held a virtual monopoly over timber production with one of the highest profits (75 euros per ha of total area of SFMO) within the sample, even though 42% of forests are privately owned. Apart from forestry, Coillte has a very diverse business portfolio (see Table 3.5): from panels' production to infrastructure projects.

Figure 3.5: Labour productivity in SFMOs (own elaboration)



Outlier 1 (O1) —National Forest Administration Romsilva (Bucharest, Romania). This SFMO owns a big area and covers around 47% of total forest cover in the country. A total of 73% of Romsiva's area is a production forest and growing stock is the highest among the analyzed SFMOs—453 m3/ha compared to a median of 257 m3/ha. However, the indicator "Profit per ha of total forest area" for Romsilva is not that high in comparison with others. It is 8 euros/ha, when, for example, in the neighboring Czech Republic, it is more than 155 euros/ha. At the same time, labor productivity is half (5.4 employees/1000 ha in Romsilva, 2.6 employees/1000 ha in LSR) (see Figure 3.5).

Outlier 2 (O2) is Veneto Agricoltura (Rome, Italy). Veneto Agricoltura is a Regional Agency that supports the Regional Council in the areas of agriculture, agro-food, forestry, and fishery. In our study, we only focused our attention on the forestry part of the organization, specifically on the Cansiglio Forest. Compared to other SFMOs, it is the smallest enterprise. Profits gained from selling wood and concessions fee are reinvested in forest management.

Outlier 3 (O3) —Lesy České republiky, s.p. (LČR) (Hradec Králové, Czech Republic). It is the most profitable SFMO within the sample. Profit per ha of forest area in LČR is 155.8 euro/ha, whereas the sample mean is only 27 euro/ha.

3.6. Discussion

3.6.1. General considerations

In this research, we chose to use a cluster analysis because we wanted to see what groups of SFMOs display similar SFM priorities. Only a few studies have been carried out on this topic. We found one model to study the SFMOs' performances proposed by Krott and Stevanov (2008) on a benchmarking model for comparing the performance of two selected State Forest Institutions (SFI): profit-seeking and activating. The model was based on eight criteria (Orientation toward demand on existing private goods, Orientation toward public-good and merit-good demand, Ecological sustainable management, Production efficiency, Profits from forests, Orientation toward new forest goods, Speaker for forestry, Mediator of all interests in forests). The model helped in the identification of some of the indicators in this study (e.g., profits from forest, new forest goods). However, we used a cluster analysis as we sought to group similar organizations rather than to benchmark each of them by a single indicator.

3.6.2. Cluster analysis and PCA

SFMOs with diversified goals—Cluster 1 (Statskog - Norway; Metsähallitus - Finland). This model of managing state property aims to balance the three pillars of sustainability. SFMOs operate in a highly competitive market in economies where forestry contributes significantly to the GDP (World Bank, 2005b). Therefore, both SFMOs have a strong focus on commercial forestry but within a limited area of organization and comprehensive focus is on environmental concerns and the delivery of public goods as main guidelines. These countries are positioned close together in Figure 3.2 of the PCA, specifically with respect to indicators such as AWU, percentage of private owned forests, and Production function for forest area. Additionally, these countries have very high standards for statistics availability and transparency. This finding is in agreement with the study of Bastida and Benito (2007), in which both countries were identified as top-performing for transparency, meaning they have modern accounting systems, not only in the private, but also in the public secto. These

countries are among few that report on the monitoring of outdoor recreation activities nationwide (Nordic Council of Ministers, 2013). In fact, the SFMOs of these two countries were those who provided the highest number of indicators including social issues that were problematic to collect in other SFMOs (e.g., Metsähallitus (Finland) provided indicators such as "accidents during work for employees", "number of technical training hours/training days per employee, average", "number of tourist visits", and others; Statskog (Norway) provided "number of health and safety training hours per employee, average", "cultural heritage sites", and others). Thus, we can argue that these SFMOs are well advanced in integrating all the three pillars of the SFM into their management practice, as well as principles of transparency and information disclosure.

SFMOs—protectors of public interests—Cluster 2 (Landesbetrieb ForstBW - Germany; Office National des Forêts (ONF) - France; Landesforst Mecklenburg-Vorpommern - Germany). In both countries, forest management is based on "close-to-nature" principles and SFMOs perform as protectors of forest. We can argue that the environmental pillar of SFM is strong in these countries. In Germany, a significant proportion of forest areas (up to 70%) are designated as protected areas according to the different protection categories delineated in the forest law and nature protection law (Spielmann et al., 2013). The ONF in France is the only authority in charge of implementing the French forestry regime that requires that forests are liable to strict management planning based on the multi-functionality of the forest. French public opinion shares this idea of the forestry regime and is not usually favorable to logging. For the population, the forest should remain a place to walk in natural surroundings, left in relative wilderness (Tissot and Kohler, 2013). In the countries of C2, forestry is of minor importance and its contribution to the national income is quite modest compared to other economic sectors. Moreover, for the last several decades, this model of state forestry has been ineffective and has required sizeable subsidies (Tissot and Kohler, 2013), as indicated by the low performance in "profit/assets", which indicates the inefficient management of resources even if there is the potential for the development of commercial forestry. The current federal government is therefore seeking to improve the effectiveness of forestry administrations and reduce the bureaucracy (Brukas, 2010) given that 85% of the forestry regime's financing plan comes from the central government in the form of compensatory payments designed to cover the ONF's management costs (Tissot and Kohler, 2013). These SFMOs are characterized by the higher number of employees per 1000 ha compared to other SFMOs, which might be explained by the fact that commercial functions and the delivery of public goods are not separated. The results of the PCA show that the differences between countries are in PC2 and PC3. The variables that most influence these differences are production function percentage for all forest area in PC2 (75% in France and 0% in Germany (FAO, 2010)) and growing stock in PC3 (in favor of Germany). However, it is worth noting that the data for Germany for production function percentage for all forest area is not consistent with data obtained from the questionnaire, where more than 90% is dedicated to production forests.

Profit-oriented SFMOs—Cluster 3 (LESY Slovenskej republiky - Slovakia; Croatian Forests (Hrvatske šume) Ltd. - Croatia; State Forests National Forest Holding - Poland; State Forest Management Centre (RMK) - Estonia; Austrian Federal Forests (ÖBF) - Austria; Directorate General of State Forests (DGST) - Lithuania; Coillte – Ireland; LESY Slovenskej republiky - Slovakia and Hrvatske Šume Ltd. - Croatia). These SFMOs have adopted a commercial model of forest management, and therefore, the economic pillar of SFM prevails. It is interesting to note that this model is used in both forest rich (e.g., Austria and Poland) and low forested countries (e.g., Ireland).

Thus, it seems that the predominance of economic goals is not necessarily connected with the importance of the forests in the national economy, as one might have expected. It is interesting to note that Irish Coillte is the commercialized state organization that manages to retain a dominant share of the market, where private forest owners do not feature significantly in the timber economy (World Bank, 2005b). However, Coillte has the biggest institutional challenge over the next 10 years as private owners begin to compete as their forests reach maturity and they become competitors in the Irish market (World Bank, 2005b). Together with Coillte, other SFMOs apart from Austrian ÖBF manage a significant part of the forest area in their countries. It is therefore important to remember that when commercialized state organizations operate in economies where the share of private forest ownership is low or is expected to increase over time, they can pose a threat to private producers because of their dominant position in the market, which they are unlikely to yield (World Bank, 2005b). The C3 also contains SFMOs with different organizational structures, such as joint stock companies owned by the State in Ireland and Austria and a state enterprise as a government department in Poland (Liubachyna et al., 2017). The State Forests (Poland) is a hierarchical organization with policy-making and forest management being integrated within one entity. Brukas (2010) characterized this SFMO with a command style administration, while ÖBF and Coillte have functions of profit-oriented managers. The cluster analysis results for SFMOs do not seem to be very similar with groups that we can distinguish with the help of PCA for countries. C3 is relatively large and consists of SFMOs from countries with very different profiles. The differences are in geographical location, natural conditions, economic, and social development. We can therefore assume that the direction and management goals of SFMOs do not depend solely on the country characteristics or geographical region, but on their own priorities.

The Outlier 1 is The National Forest Administration Romsilva (Regia Naţională a Pădurilor Romsilva), in Romania, is a state-owned enterprise with a commercial mandate that is responsible for the development of publicly owned forests, and the management of hunting and fishing grounds (Abrudan, 2012). More than 90% of its income comes from timber sales. Beleţu (2011) stated that Romsilva is a large enough organization to cover the financial costs and thus be financially independent of the state; the leverage effect will allow it to improve profits, without being affected by financial risk (Beleţu, 2011). However, in a comparison with other SFMOs in neighboring countries and assuming similar natural conditions, our findings indicate that resources could be used more efficiently and bring more profit to the SFMO. Data collected from Romsilva as a production-oriented organization has the resources for increasing its profitability. With its management priority, it is very close to C3.

The Outlier 2 is represented by Veneto Agricultura, specifically the Cansiglio Forest, in Italy. It is hard to compare it to others due to its size. It is a public services oriented organization. However, in the Cansiglio Forest, there has historically been and currently is a well-developed timber production organization. Additionally, many projects are aimed at delivering public goods, mainly recreational activities (De Martin and de Savorgnani, 2014). Thus, their management model is close to C1.

The Outlier 3 is LČR, Czech Republic. Its high profitability might be explained by an economic reform of forestry in the country after 1990 when supervision in the state forests was separated from operating performance. LČR's business strategy is based on complex contracting out of forestry operations and on the sale and purchase of timber for the price at the stump (Kupčák, 2005). At the same time, LČR is the largest manager of protected sites in the Czech Republic. It manages sites with

a high conservation interest with due regard for the individual categories of land protection, and particularly the presence of protected species, valuable habitats, and other significant natural and cultural phenomena. LČR is very close to C3, in particular to Coillte (Ireland), as both of them are big players in the forest economy of their countries with a very efficient use of resources.

The existence of diverse SFMO clusters illustrates the possibility of different approaches to SFM with a focus on multiple management goals (e.g., profit gaining, environment protection, or a more balanced combination of different public services delivery).

3.6.3. Data availability

There is a lack and inconsistency of data at both the national and SFMO level. Some magnitudes and trends can be inferred from existing studies of individual countries, but different definitions of state ownership and data scarcity make cross-country comparisons difficult. Data about forestry at a national level are spread over different databases (EUROSTAT, World Bank, etc.). However, there is still a lot of data missing and/or not updated, and data are very often aggregated by region, which does not allow for comparison within a region. These limitations were identified in a study commissioned by the European Centre of Enterprises with Public Participation and of Enterprises of General Economic Interest (CEEP), where it was concluded that specific data for the forest sector are not covered in any of the data sources (CEEP, 2013). The situation with SFMOs is even worse. The differences between countries and SFMOs in the legal framework, forest management objectives, system of accountancy, etc., result difficulties in a comparison between organizations in terms of financial, social, and environmental indicators. In addition, there is very little data in English available on-line. In most cases, SFMOs did not reply with data on social issues that are challenging forestry and should be at the core of the attention of SFM, such as "number of technical training hours per employee", "number of health and safety training hours per employee", "accidents during work for employees", etc. Consequently, many indicators that were selected in this study were eliminated due to insufficient data. It remained unclear whether the data were not available because the companies do not collect it or do not report it. Typical economic/financial data are better presented, but even so, it is difficult to make a comparison because of the differences among data provided. We can conclude that there is a gap in transparency and information disclosure by SFMOs on emerging key issues (such as social issues, while more is available on biodiversity for example). It is worth noting that greater numbers of indicators for the analysis might have modified the results of obtained clusters, especially social ones, as their presence is very limited in the research.

3.7. Conclusions

The article lays the groundwork for a deeper understanding of state-owned forests in Europe. Different characteristics of the forest sector in the EU countries (e.g., the area of state forests, their relative importance for government budgets, the scope of their responsibilities, and the social and environmental obligations assigned to them) result in different performances among SFMOs. For example, there is typically one large SFMO per country (e.g., Metsähallitus in Finland), but there are exceptions (e.g., Lithuania with 42 State Enterprises). Some of SFMOs are heavily market oriented with a strong economic pillar of SFM, such as Coillte (Ireland) and LČR (Czech Republic), and others put a bigger emphasis on public goods service delivery (social pillar), especially nature protection (environmental pillar), such as SFMOs in Germany.

Through a comparison of countries grouped by PCA and SFMOs clustering, we can conclude that the way SFMOs are organized and managed is often predetermined by the specific conditions of the forest sector in the country. However, there are exceptions (e.g., Ireland, Austria) when the forest sector of a country does not always define the way a specific SFMO decides to manage its land. Of course, country characteristics lay down preconditions for the development of the sector, but it is up to the SFMO to choose a management direction and priorities.

In the cluster analysis, we identified three main groups of SFMOs. The main reason for this division is a different prioritization of SFM pillars, mainly in two ways: profit or ecosystem services delivery or a combination of these. Some of the SFMOs lean towards the economic pillar of SFM, whereas others tend to first of all satisfy the environmental and social aspect of SFM. It is important to note that regardless of the ultimate goal, all SFMOs follow the principles of SFM. Cluster analysis resulted in three groups of SFMOs and three outliers. The cluster C1 was composed of organizations with a strong emphasis on service delivery, but at the same time, with a rather small area compared to the total area of SFMOs and with a strongly profit-oriented forestry and diversified business portfolio (well balanced pillars of SFM). Cluster C2 presents service-oriented SFMOs without a profit gaining goal, mainly subsidized by the government (environmental pillar prevails). Cluster C3 represents SFMOs with a profit-oriented goal (economic pillar prevails). Outlier 1 (Romsilva) and Outlier 3 (LČR) are leaning towards Cluster 3. Outlier 2 (Veneto Agriculture) is similar to Cluster 1.

In summary, the most substantial general performance trends were: (i) most SFMOs are owned by the state but function as a private unit; (ii) an increased importance is given to environmental services and social inclusiveness in the management of SFMOs, specifically in Nordic countries (i.e., Finland, Norway); (iii) SFMOs actively develop new business activities; among the most common are those in the renewable energy sector, in real estate, and in tourism and recreation; (iv) increased outsourced activities and consequent reduction of SFMO personnel are common trends.

The lack of a wider range of explanatory variables and more comprehensive data sets were the major obstacles to a broader analysis in this study. Despite these limitations, this work enriches the knowledge about the state-owned forest sector and its performance in Europe. In terms of a recommended way forward for SFMOs, we can argue that there is a need for optimization between social, economic, and ecological pillars in SFM by SFMOs. Finding a better balance between the competing demands on Europe's forests may require different management approaches/models. An SFMO management model in one country may be an important catalyst for reforms and changes in the other countries; however, a model is not directly transferable and has to be interpreted in the natural conditions, political, and socioeconomic context of the recipient country. The existence of one single, "best model" of organization is highly unlikely. However, the findings from this work stress the importance for future studies to have a closer look at particular case studies of different management models, their implications, possible obstacles, and positive outcomes with a wider set of indicators and their changes over time. It will bring researchers and policymakers to a better understanding of the management of SFMOs and factors that are influential for their success.

3.8. References

Abrudan, I.V., 2012. A decade of non-state administration of forests in Romania: achievements and challenges. Int. For. Rev. 14, 275–284. https://doi.org/10.1505/146554812802646684

Ambrose-Oji, B., Lawrence, A., Stewart, A., 2015. Community based forest enterprises in Britain: Two organising typologies. For. Policy Econ. 58, 65–74. https://doi.org/10.1016/j.forpol.2014.11.005

Anderberg, M.R., 2014. Cluster analysis for applications. Academic Press/Elsevier Science, Cambridge, MA, USA.

Bastida, F., Benito, B., 2007. Central government budget practices and transparency: an international comparison. Public Adm. 85, 667–716. https://doi.org/10.1111/j.1467-9299.2007.00664.x

Beleţu, E.C., 2011. Performance study on National Forest Administration ROMSILVA based on traditional indicators. Ann. Univ. Craiova—Economic Sci. Ser. Ed. Univ. Craiova 39, 72–80.

Belloc, F., 2014. Innovation in State-Owned Enterprises: Reconsidering the Conventional Wisdom. J. Econ. Issues 48, 821–848. https://doi.org/10.2753/JEI0021-3624480311

Brukas, V., 2010. Model of state forestry administration and media thriller in Lithuania, in: Helles, F., Steen Nielsen, P. (Eds.), Proceedings of the Biennial Meeting of the Scandinavian Society of Forest Economics Gilleleje, Denmark, May 2010. Scandinavian Forest Economics, Gilleleje, pp. 131–144.

Brukas, V., Kuliešis, A., Sallnäs, O., Linkevičius, E., 2011. Resource availability, planning rigidity and Realpolitik in Lithuanian forest utilization. Nat. Resour. Forum 35, 77–88. https://doi.org/10.1111/j.1477-8947.2011.01380.x

Brukas, V., Weber, N., 2009. Forest management after the economic transition : at the crossroads between German and Scandinavian traditions. For. Policy Econ. 11, 586–592. https://doi.org/10.1016/j.forpol.2009.08.009

Buuren, S. van, Groothuis-Oudshoorn, K., 2011. mice: Multivariate Imputation by Chained Equations in R. J. Stat. Softw. 45, 1–67. https://doi.org/10.18637/jss.v045.i03

CEEP, 2013. Mapping evolutions in Public Services in Europe : towards increased knowledge of industrial relations. Cambridge.

Cesaro, L., Gatto, P., Pettenella, D. (Eds.), 2008. The multifunctional role of forests: policies, methods and case studies, in: The Multifunctional Role of Forests: Policies, Methods and Case Studies, 28–30 April, 2005, Padova, Italy. 45 Contributions. European Forest Institute (EFI) Proceedings, Joensuu, Finland, p. 380.

Chang, H., 2007. State-Owned Enterprise Reform, Policy notes in United Nations Department of Social and Economic Affairs (UNDESA). New York, NY, USA.

Cuervo-Cazurra, A., Inkpen, A., Musacchio, A., Ramaswamy, K., 2014. Governments as owners: State-owned multinational companies. J. Int. Bus. Stud. 45, 919–942. https://doi.org/10.1057/jibs.2014.43

De Martin, L., de Savorgnani, V., 2014. The Cansiglio Forest. Padua, Italy.

Delang, C.O., Wang, W., 2013. Chinese forest policy reforms after 1998: the case of the Natural Forest Protection Program and the Slope Land Conversion Program. Int. For. Rev. 15, 290–304. https://doi.org/10.1505/146554813807700128

EC, 2012. Forest-based industries - European Commission [WWW Document]. URL https://ec.europa.eu/growth/sectors/raw-materials/industries/forest-based_en (accessed 3.23.17).

European Commission, 2016. State-owned enterprises in the EU: lessons learnt and ways forward in a post-crisis context. Brussels, Belgium. https://doi.org/10.2765/99224

EUROSTAT, 2011. Forestry in the EU and the world — A statistical portrait. Publications Office of the European Union, Luxembourg city, Luxembourg. https://doi.org/10.2785/13022

EUSTAFOR, 2016. Managing State Forests in Europe, European State Forest Association. Brussels, Belgium.

Food and Agriculture Organization of the United Nations (FAO), 2015. Global Forest Resources Assessment 2015. Rome, Italy. https://doi.org/10.1002/2014GB005021

Food and Agriculture Organization of the United Nations (FAO), 2014. Contribution of the Forestry Sector to National Economies, 1990-2011. Rome, Italy.

Food and Agriculture Organization of the United Nations (FAO), 2010. Global Forest Resources Assessment. Rome, Italy.

Forestry and Timber - UNECE [WWW Document], n.d. . Jt. For. Eur. Quest. pan-European Quant. Indic. Sustain. For. Manag. URL https://www.unece.org/forests/areas-of-work/forest-resources/methods-and-processes/pan-european-reporting-2015.html (accessed 12.4.17).

GRI, 2014. G4 Sustainability Reporting Guidelines, Global Reporting Initiative. Amsterdam, The Netherlands.

James, G., Witten, D., Hastie, T., Tibshirani, R., 2013. An Introduction to Statistical Learning - with Applications in R, Springer Texts in Statistics. Springer-Verlag New York, New York, NY. https://doi.org/10.1007/978-1-4614-7138-7

Jöbstl, H.A., 2008. Can traditional forestry accounting contribute to measuring the sustainability of a forest enterprise, in: Cesaro, L., Gatto, P., Pettenella, D. (Eds.), The Multifunctional Role of Forests: Policies, Methods and Case Studies, 28–30 April, 2005, Padova, Italy. European Forest Institute (EFI) Proceedings, Joensuu, Finland, pp. 183–193.

Joliffe, I., Morgan, B., 1992. Principal component analysis and exploratory factor analysis. Stat. Methods Med. Res. 1, 69–95. https://doi.org/10.1177/096228029200100105

Kant, S., 2009. Global trends in ownership and tenure of forest resources and timber pricing, Report submitted to the Ontario Professional Foresters Association. Georgetown, Canada.

Kim, J., Chung, H., 2007. Empirical Study on the Performance of State-owned-enterprises and the Privatizing Pressure: The Case of Korea [WWW Document]. URL http://regulation.upf.edu/utrecht-08-papers/jkim.pdf

Konečný, O., 2014. Rural development, multifunctionality and agriculture: The perspective of Czech farmers., in: Smutka, L. (Ed.), Proceedings of the Conference Agrarian Perspectives XXIII. Prague, pp. 304–311.

Kowalski, P., Büge, M., Sztajerowska, M., Egeland, M., 2013. State-Owned Enterprises: Trade effects and policy implications, The Organisation for Economic Co-operation and Development (OECD) Trade Policy Papers. The Organisation for Economic Co-operation and Development (OECD) Publishing, Paris, France. https://doi.org/http://dx.doi.org/10.1787/5k4869ckqk7l-en

Krott, M., Stevanov, M., 2008. Comprehensive comparison of state forest institutions by a causative benchmark-model. Ger. J. For. Res. 179 (4), 57–64.

Kubeczko, K., Rametsteiner, E., Weiss, G., 2006. The role of sectoral and regional innovation systems in supporting innovations in forestry. For. Policy Econ. 8, 704–715. https://doi.org/10.1016/j.forpol.2005.06.011

Kupčák, V., 2005. Elementary financial analysis of the Forests of the Czech Republic, state enterprise. J. For. Sci. 51, 127–140.

Kupčák, V., 2003. Economic analysis of forest joint-stock companies in the Czech Republic in 1992–2000. J. For. Sci. 49, 27–36.

Levá, M., Čermáková, H., Stárová, M., Vostrovská, H., 2016. The assessment of forestry companies in the Czech Republic with focus on profitability. J. For. Sci. 62, 116–125. https://doi.org/10.17221/88/2015-JFS

Liubachyna, A., Secco, L., Pettenella, D., 2017. Reporting practices of state forest enterprises in Europe. For. Policy Econ. 78, 162–172. https://doi.org/10.1016/j.forpol.2017.01.019

Metsähallitus Group, 2016. Metsähallitus` year and Corporate Social Responsibility in 2015. Vantaa, Finland.

Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC., USA.

Nordic Council of Ministers, 2013. Social Indicators in the Forest Sector in Northern Europe: A Review focusing on Nature-based Recreation and Tourism. Nordic Council of Ministers, Copenhagen. https://doi.org/10.6027/TN2013-584

OECD, 2010. Accountability and Transparency – A Guide for State Ownership. Paris, France.

OECD, 2005. Corporate governance of state-owned enterprises. A Survey of OECD countries. OECD, Paris, France.

Peng, M.W., Bruton, G.D., Stan, C. V., Huang, Y., 2016. Theories of the (state-owned) firm. Asia Pacific J. Manag. 33, 293–317. https://doi.org/10.1007/s10490-016-9462-3

PricewaterhouseCoopers, 2015. State-owned enterprises catalysts for public value creation? [WWW Document]. URL https://www.pwc.com/gx/en/psrc/publications/assets/pwc-state-owned-enterprise-psrc.pdf (accessed 12.10.17).

Schmithüsen, F., Hirsch, F., 2010. Private Forest Ownership in Europe. United Nations, Geneva.

Spielmann, M., Bücking, W., Quadt, V., Krumm, F., 2013. Integration of Nature Protection in Forest Policy in Baden-Württemberg (Germany). INTEGRATE Country Report. EFICENT-OEF, Freiburg, Germany.

Statskog [WWW Document], URL https://www.statskog.no/ (accessed 12.8.17).

Stevens, J., 2009. Applied multivariate statistics for the social sciences. Routledge, New York, USA.

Teder, M., Mizaraite, D., Mizaras, S., Nonic, D., Nedeljkovic, J., Sarvasova, Z., Vilkriste, L., Zalite, Z., Weiss, G., 2015. Structural Changes of State Forest Management Organisations in Estonia, Latvia, Lithuania, Serbia and Slovakia since 1990. Balt. For. 21, 326–339.

The Organisation for Economic Co-operation and Development (OECD), 2015. OECD guidelines on corporate governance of state-owned enterprises, OECD Publishing. OECD Publishing, Paris, France. https://doi.org/10.1787/9789264244160-en

Tibshirani, R., Walther, G., Hastie, T., 2001. Estimating the number of clusters in a data set via the gap statistic. J. R. Stat. Soc. Ser. B (Statistical Methodol. 63, 411–423. https://doi.org/10.1111/1467-9868.00293

Tissot, W., Kohler, Y., 2013. Integration of Nature Protection in Forest Policy in France. INTEGRATE Country Report. EFICENT-OEF, Freiburg, Germany.

United Nations, 1992. Report of the United Nations Conference on Environment and Development. A/CONF.151/26 (Vol. III) Forest Principles. Rio de Janeiro, Brazil.

von Detten, R., Faber, F., 2013. Organizational decision-making by German state-owned forest companies concerning climate change adaptation measures. For. Policy Econ. 35, 57–65. https://doi.org/10.1016/j.forpol.2013.06.009

Wolfslehner, B., Vacik, H., 2008. Evaluating sustainable forest management strategies with the Analytic Network Process in a Pressure-State-Response framework. J. Environ. Manage. 88, 1–10. https://doi.org/10.1016/j.jenvman.2007.01.027

World Bank, 2005a. State forest enterprise reform in Vietnam : review of policy and implementation framework for Decree 200 - technical note. Washington, DC, USA.

World Bank, 2005b. Forest Institutions in Transition: Experiences and Lessons from Eastern Europe. Washington, DC, USA.

World Bank, World Development Indicators | Data [WWW Document]. URL http://data.worldbank.org/data-catalog/world-development-indicators (accessed 7.21.17).

Chapter IV

Article 3: The future of Public Forests: the case of the Cansiglio Forest in Italy

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Author Contributions: Liubachyna, A., Secco, L. and Pettenella, D. jointly conceived and designed the idea of the article; Liubachyna, A. collected data from employees, analyzed and interpreted data, and wrote the paper; Secco, L. helped to structure the contents, provided suggestions on how to interpret the data and carried out the overall critical revision of the article; Mario Visentin collected data from environmentalists and assists in Italian-English translations.

4.1. Abstract

Forest management planning today faces fundamental challenges to continuously provide forest goods, protect biodiversity, and satisfy public demands. It is a difficult task for any forest organization to meet these expectations operating in such a vulnerable ecosystem and with a progressive reduction of budget. Forest exploitation is publicly regulated for reasons of sustainability, and often a large part of these resources is publicly owned. However, in the last decades in Europe and worldwide there has been a tendency among state-owned forest organizations to reduce their forest management tasks and either delegate them to privately-owned entities or promote co-management solutions with the involvement of local communities. In this article, we want to see how a forest organization is managed and to discuss possible scenarios of its organizational structure development using the example of the Cansiglio Forest (CF), a publicly owned Italian forest. The qualitative methodological approach includes scenarios analysis and analysis of employees' and environmentalists' perceptions about current management and future perspectives of the CF. In the study, four scenarios are presented: (1) sale of the public land to a private organization, (2) creation of a company under state control, (3) a long-term concession in favor of a Non-Governmental Organization (NGO), (4) long-term forest concessions signed by private enterprises. The fourth scenario was evaluated as the most promising.

Key words: public organization, forest organization, ecosystem services, Cansiglio Forest, scenario analysis, Italy.

4.2. Introduction

The public sector is increasingly expected to be responsible and accountable for the interests it is intended to serve. State organizations aim to deliver social and public services. This function is highlighted not only because of the financial means they provide, but more widely by how they contribute to public values creation, taking an integrated and holistic view of their interactions (PricewaterhouseCoopers, 2015).

In the last decade, the demand for services provided by forests has increased significantly. Delivery of forest services is in line with the forest management approach of multiple-use[14]. Although

[14] Nix (2012) referred to it as: "the management of land or forest for more than one purpose, such as wood production, water quality, wildlife, recreation, aesthetics, or clean air". It is "a concept of forest management that combines two or more objectives, such as production of wood or wood-derivative products, forage and browse for domestic livestock,

forests are historically associated with wood production (Buttoud, 2000), they also fulfil multiple economic, social and environmental functions (e.g., Bastrup-Birk et al., 2016). The concept of multifunctionality is strictly connected with the provision of ecosystem services[15]. Based on the importance of ecosystem service functions and the limited use of the natural resource due to the renewal capacity of the resource base (Chang, 2007), their management is often strictly regulated by governments, while the provision of forest ecosystem services is often the responsibility of state-owned organizations (around 40% of the forest area in the EU is publicly owned (EUROSTAT, 2011)). In fact, despite some negative aspects of state ownership (e.g. the Principal-Agent Problem, the Free-Rider Problem, the Soft Budget Constraint) (e.g. Chang, 2007; Varcholova and Beslerova, 2013), the literature shows that one of the main commonly stated reasons for state ownership is provision of public goods and increased access to public services (e.g. OECD, 2005; World Bank, 2005). The state can require state-owned organizations to provide certain goods and services for free or sell them at reduced prices to targeted groups as a way of making some services more affordable for the public through cross-subsidization (OECD, 2005; World Bank, 2005).

Due to the increased demand for ecosystem services, managers require new policy tools in order to create or consolidate a shift in forest management from the traditional production function towards more multifunctional goals (Gatto et al., 2009). Forest services connected with environmental and social benefits are often perceived as conflicting with timber production as incorporating these services into the forest management can reduce the income from timber harvests. One option to solve these conflicts may be to subdivide the land and allocate areas to each use (Hall, 1997). Another option that has received a great deal of attention, and many practical applications is payment for environmental services (PES), as it makes environmental services a subject of trade (e.g. Wunder, 2006; Gatto et al., 2009; Pettenella et al., 2012). The need to find an equilibrium between capabilities of forests for providing environmental services and obtaining revenue from their exploitation led to a variety of forms of organizational structure for forest organizations that can be based on cooperation among public and private bodies and the use of market tools (Sturla, 2012).

Following these trends, some European State Forest Management Organizations (SFMOs)[16] are transitioning from forest management focused mainly on timber production to service delivery management. These transitions might influence the way SFMOs are structured and function over time (Agrawal et al., 2008). One SFMO that has as its main objective environmental services delivery and timber production and has already started to benefit from the help of private bodies in its management is the Cansiglio Forest (CF), a publicly owned forest in the North-East of Italy. This paper aims to set an analysis of the current objectives and state of the CF management and to present and discuss possible scenarios for its future organizational structure development as alternatives to the present structure that is currently under reform. The scenarios take into consideration possible changes in ownership and their

proper environmental conditions for wildlife, landscape effects, protection against floods and erosion, recreation, and protection of water supplies" (cross reference from Sabogal et al., 2013).

[15] The Millennium Ecosystem Assessment (2005) defined ecosystem services as "multiple benefits provided by ecosystems to humans" and classified them including specifically forest services into several categories, including overarching support (e.g. primary production), regulating (e.g. climate regulation), provisioning (e.g. timber, non-timber production), and cultural (e.g. recreation) services.

[16] SFMOs are "commercially-oriented state forest companies, enterprises and agencies that have SFM and sustainable wood production as major concerns" (EUSTAFOR, 2016).

possible effects on the set objectives and the territory development around the forest.

The research context is briefly outlined based on the changes in the Italian and Veneto region forest sector (section 4.3.1.), followed by the description of the case study (section 4.3.2.). After describing the research methodology (section 4.4) and scenarios (section 4.5.), results of the study are presented (section 4.6.). The final part of the paper gives the conclusions about the current management of the CF and evaluation of the scenarios (section 4.7.).

4.3. The research context

4.3.1. Changes in Italian and Veneto region forest sector

The Italian forest sector went through fundamental changes in the last decades. Forest cover doubled in the last 50 years, and demand for forest products and services has grown rapidly in the last decades (Pettenella and Secco, 2004). At the same time, the institutional organization of the forest sector, mode of forest governance and its frameworks have not changed substantially. The decentralization process has been the single most significant reform process in introducing changes in Italian forest governance. Central to this idea is that the central State administration should play no part in policy-making, and all forest tasks have been delegated to the 21 Regional Administrations and Autonomous Provinces (Secco et al., 2017). One of the main results of this process is that Italy does not have a national forest framework policy any longer, but 21 local (regional) forest policies (Pettenella and Secco, 2004). However, most of the Italian formal institutions involved in the forest sector have not been able to reform and adjust themselves to the new contexts framed by environmental, social, economic and political changes. Many of these administrations were limited in their policy and political action, sometimes to the extent that no regional forest policies were implemented and many responsibilities were then transferred back to the Central administration under formal bilateral agreements (Secco et al., 2017). Such a complex and fragmented legal-policy situation, originating from a defective decentralization process, has a negative effect on the efficiency of Italian public administration. It has contributed to aggravating the problem of financial viability of forest management oriented at forest multi-functionality and ecosystem services provisions. Another result of this situation, is an absence of a comprehensive forest sector policy supported by coordinated budget allocations (Carbone and Savelli, 2009).

Veneto region, where the case study is located, recently went through some major changes in its administrative setting. So, forest tasks are no longer the responsibility of the specific dedicated department, which has been demolished and its functions split (i.e. agriculture and rural development, biodiversity protection, soil protection and hydrogeological risk management, tourism, civil protection – as for forest fires management) (Pettenella, 2013). The former Regional Forest Service was subdivided into five offices, and resources and activities under its responsibility have noticeably decreased. This reduction also affected the regional agency Veneto Agricoltura (VA) (Secco et al., 2017), that is directly responsible for the management of the CF. VA is the Veneto Region Agency aimed at "promoting and carrying out interventions for the modernization of farms and agro-forestry, soil conservation, as well as making the best effective use of agricultural land, the development of aquaculture and fisheries, in particular concerning research, experimental trials and support of the market" (R. L. 35/97 – art. 2). Moreover, VA is specifically dedicated to the safeguarding and preservation of biodiversity through the management of regional forest nurseries, nature reserves and

state forests (Veneto Agricoltura, 2017). In 2017, Regional agency Veneto Agricoltura went through an important reform. From 01 January 2017, the Law N. 37 from 28.11.2014 came into force and Veneto Agricoltura was liquidated and all its assets were transferred to a newly created Venetian Agency for Innovation in the Primary Sector *(in Ital. l'Agenzia Veneta per l'Innovazione nel Settore primario – AVISP*). The Veneto Agency for Innovation in the primary sector is an instrumental body of the Veneto Region, which will support the Regional Council in the field of policies affecting the agricultural, agri-food, forestry and fisheries sectors. It will also have to deal with applied research and experimentation aimed at testing and disseminating technological and organizational innovations aimed at improving the competitiveness of companies and production chains, environmental sustainability, in the agricultural, agri-food, forestry and fisheries sectors. When the research was conducted, it was still not officially announced how this transformation would influence on the management and administrational structure of the CF.

4.3.2. Study Area: the Cansiglio Forest

The CF is located in the North-East of Italy, on the border between Friuli-Venezia Giulia and Veneto regions (see Figure 4.1). It covers an area of almost 6000 hectares[17] (1,4% of total forest area of Veneto region). It is a mountain beech forest. At lower levels, the beech is mixed with silver fir and oriental spruce. At the foot of the valley where it is colder, there is an area of pastureland with herbaceous vegetation of natural origin that has been modified by man over time for livestock purposes (De Martin and de Savorgnani, 2014). The CF is represented by 34.4% of broadleaved woodland, 19.4% is covered by plantation, 29.6% is mixed woodland, 14% is grassland and the remaining 2.6% is new forest stands (Cantarello and Newton, 2008a). There are many species of fauna in the CF, people often visit the area in order to observe the deer (population around 3000), specifically red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*) and fallow deer (*Dama dama*) (De Martin and de Savorgnani, 2014).

Figure 4.1: Map with the location of the Cansiglio forest (own elaboration)

[17] Total forest area in Italy is 9297 thousand ha (EUROSTAT, 2011), in Veneto Region - 425 thousand ha (Regione del Veneto, 2014).

Today the CF forest management is inspired by naturalistic criteria where one of the main aims is to achieve an ecologically stable forest (Cantarello and Newton, 2008a). The shelterwood system and a selection of silviculture methods are implemented to obtain forest structures and functions similar to those of natural forests, as well as providing a source of timber. The silviculture methods are aimed to maintain and improve biodiversity, ensure natural regeneration and prevent epidemics; some areas are also left to natural evolution. The whole forest is a Site of Community Importance (SCI) according to Directive 92/43/EEC "Habitat" and a Special Protection Area (SPA) according to Directive 79/409/EEC "Birds", which involves inclusion of these areas in the NATURA 2000. The CF is a part of the SCI and SPA IT3230077 - Cansiglio Forest. (Drábková, 2013; Marchiori et al., 2012). In 2005 the CF was certified according to the Programme for the Endorsement of Forest Certification (PEFC) scheme (Cantarello and Newton, 2008b).

In addition to forestry, there are other types of private activities in the area (e.g. farms, dairy) that have concession contracts with VA. The plain also offers recreational facilities (restaurants, hotels, picnic areas); in summer there is a golf course and in winter there are tracks for cross-country skiing (De Martin and de Savorgnani, 2014).

The CF is also of historical value. Among the most important findings are incontestable traces of the presence of Prehistoric man (about 100,000 years ago), evidence of a relationship between the Cansiglio and groups of hunters/gatherers who frequented the plateau 12,000 years ago, remains of settlements from the Mesolithic era that were identified due to the presence of numerous stone objects. The CF was hugely important for the Most Serene Republic of Venice (Italian: Serenissima Repubblica di Venezia): its numerous beech woods were mainly used for the production of oars, timber and charcoal (De Martin and de Savorgnani, 2014)

4.4. Method

A case study research method[18] (Yin, 2009) is used for the analysis. In order to reach the aim of the research we followed the next principal steps: (i) framing scenarios for the future organizational structure of the CF; (ii) analysis of the existing situation in the CF management; (iii) evaluation of the scenarios by the employees of the CF; (iv) interpretation of the interviews supported by the discussion. In order to fit into these steps, three main instruments have been used: scenarios analysis, interviews with CF employees and interviews with environmentalists.

To facilitate a methodological approach, we performed a scenarios analysis. During the literature review, alternative structural arrangements for the public forest sector presented themselves. After the scenarios were adapted to the context of the CF (based on Larsen and Brukas (2000)). The relevant scenarios were presented during the interviews; the implications of each of the scenarios were analyzed based on the literature review and answers of interviewees.

We have collected qualitative data during semi-structured interviews. Semi-structured interviews are a qualitative technique to assess people's experiences, their inner perceptions and feelings of reality (Zhang and Wildemuth, 2006). We had two groups of interviewees: (1) employees

[18] "Case study research method is an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 2009)

of the CF and VA; (2) environmentalists.

The first group of interviewees were selected on the basis of their involvement in the management and decision-making process regarding the CF. In total we conducted 10 interviews with a mix of closed and open-ended questions with 7 representatives of the senior management of VA as well as with the staff who work directly in the CF (employees). The interviewees are coded as I1, I2, I3, I4, I5, I6, and I7. With three employees working directly in the CF, we have conducted two interviews as their functions in the management are quite demanding and they have more information to share than the others (I1, I2, I4). During the interviews three main themes were followed: management priorities and objectives, organization management model, evaluation of the scenarios for the organizational structure of the CF. Interviews took place in the CF and Veneto Agricultura headquarters during June – September 2017 and lasted around 1.5-2 hours, during which respondents were encouraged to highlight causes and motivations and to provide explanations of their statements. In order to limit the chance of strategic responses, interviewees were assured that all collected information would be processed in an aggregated form.

The second group of interviewees consisted of environmentalists as they are among the most active stakeholders in the area. The interviews of the environmentalists followed the same themes as the one conducted with the employees, apart from the topic of the current organization management model of the CF. The environmentalists were asked to respond to the questions during a public event organized in the CF on the 12th of November 2017. In total 8 interviews with environmentalists were conducted and their responses were coded as I8, I9, I10, I11, I12, I13, I14 and I15. They are members of the following associations: Mountain Wilderness (2), Lipu (1), CAI (1), Legambiente (2), Ecoistituto del Veneto Alex Langer (1), Una montagna di sentieri (1). Transcripts of the interviews were analyzed with the help of content analysis.

We are aware that the sample of interviewees is quite small (15). However, it is important to bear in mind that the CF is a small organizational unit (14 full-time employees, of whom 10 are white-collar employees). We have therefore tried to compensate this with a precise analysis of internal documentation. Due to the limit of time and resources we had interviews only with one group of stakeholders, i.e. environmentalist, and important categories of stakeholders (e.g. logging companies, hunters) were not included. These aspects need to be improved in future research.

4.5. Possible scenarios for public forests management

After a careful literature review about SFMOs we framed four hypothetical scenarios that might occur as alternatives to the current organizational structure of the CF. They are based on the changes that have happened globally in the SFMOs in recent decades with corrections due to the characteristics of the case study. Among the most substantial changes were the privatization process, increase of commercially managed state forest, use of cooperation with private entities, increase of demand for ecosystem services (World Bank, 2005b; Sotirov, 2014; Larsen and Brukas, 2000; Kant, 2009a; Kant, 2009b). The scenarios under analysis are detailed below. One of the scenarios implies a change of forest ownership from state to private: (1) sale of the public land to a private organization (privatization), the other three imply a change of the forest tenure[19]: (2) creation of a company under

[19] Forest tenure determines who can use what resources, for how long and under what conditions. (http://www.fao.org/forestry/tenure/en/)

state control, (3) a long-term concession in favor of a Non-Governmental Organization (NGO), (4) long-term forest concessions signed by private enterprises.

4.5.1. Scenario 1 "Sale of the public land to a private organization (privatization)"

The implication of this scenario might bring some large-scale changes into the forest management, its priorities and impact on local economy and communities. Therefore, it requires well established discussion among all stakeholders. There are examples of this scenarios in different countries, i.e. New Zealand (Hall, 1997), Chile, South Africa (Kant, 2009b). With this scenario scholars are often concerned about the possibility of conversion of forest land to other land uses if the profits are not satisfactory to a private owner. This risk can be eliminated through land-use regulations. However, there is still a risk of deforestation if land use restrictions are not strictly enforced (Karsenty et al., 2008; Koyuncu and Yilmaz, 2013), which is probably unlikely with a strong EU regulation (Bastrup-Birk et al., 2016). In addition, Koyuncu and Yilmaz (2013) in a study about private ownership in the forest sector showed that there is a negative correlation between privatization and deforestation. Another consequence of this scenario is the possibility of reduced employment for locals, as was the case in a privatization in New Zealand (Hall, 1997).

4.5.2. Scenario 2 "Creation of a company under state control"

This scenario is based on examples of a number of SFMOs in Europe that decided to separate commercial forest management operations from policy and regulatory functions (World Bank, 2005a). the common examples are Austrian Österreichische Bundesforste AG (ÖBF), Norwegian Statskog, Finish Metsähallitus. In this scenario, the new created companies remain state owned but become commercially oriented (Krott, 2008; Liubachyna et al., 2017). The land is also owned by the state and the company is managed under state control and therefore needs to follow a forest management plan and provide public services. Additionally, voluntary regulations are often embraced by companies, for example certification that helps companies to tap new markets for certified timber. Another positive characteristic of the existing forest companies is that they have established publicly available performance and reporting criteria to varying degrees. However, it is important to keep in mind, that in each case the wider economic and institutional environment is an important variable which influences company performance (World Bank, 2005a).

4.5.3. Scenario 3 "Long-term concession in favour of a Non- Governmental organization (NGO)"

NGO's help is normally used in rural communities, community based forests in developing countries, for forest-dependent people especially in the tropics (e.g. Wright and Andersson, 2013; Cronkleton et al., 2012; Matose, 2006; White and Martin, 2002). NGOs can help communities to successfully govern local forests by providing financial, technical and organizational support, mechanisms that conserve forests and increase the well-being of local people (Pretty and Ward, 2001; Cronkleton et al., 2012; Wright and Andersson, 2013). Studies show there is no risk for logging, in fact NGOs help to harvest timber in a sustainable way following the management plan (Cronkleton et al., 2012). In the literature authors highlight the risk that when foreign NGOs are in charge there may be an overdependence on outside support, and the development of forest organization models that cannot viably stand on their own. Local groups that have no access to aid, or do not meet the criteria used by external technicians to identify sites for support, might be left out (e.g. Cronkleton et

al., 2012). This ownership deal also places many demands on the bureaucracy for coping with robust complex arrangements (Matose, 2006).

4.5.4. Scenario 4 "Long-term forest concessions signed by private enterprises"

Concessions are currently a popular legal tool among forest policy decision-makers, however, they are usually associated with industrial logging (Karsenty et al., 2008). In this case, companies have long term rights to access, manage the land, harvest timber and exclude the public. In return, firms typically promise to pay royalties and other fees to the government (White and Martin, 2002). Industrial concessions can be more efficient than other ownership models (e.g. small-scale enterprises) in achieving SFM and complying with growing environmental norms. Moreover, the main strength of the concession system is a possible cancellation of the contract in a case of non-compliance with regulations (Amacher, 2006; Karsenty et al., 2008). Concessioners need to meet requirements including technical (e.g. preparation of a forest management plan), economic (e.g. maintenance of road networks of local and regional importance), social (e.g. job creation, delivery of goods and services), fiscal (e.g. fees and taxes to be paid in addition to the general fiscal regime) and environmental issues (e.g. setting aside protected areas) (Karsenty et al., 2008). In Europe there was an example of managing state-owned forests by a concessioner in Slovenia. But in 2016 a new law (323-01/15-14/59, 2016) laid the basis for cancelling the concession contracts and establishing a public forest enterprise. The prevailing opinion in society about the cancelling of concessions and creating an enterprise was that it would help to increase profitability, establish the forest-timber chain, create green jobs, as well as increase transparency of operations in the distribution of tasks in the forest and sale of timber (Šoštarič, 2016). However, not everyone has the same opinion. NGOs, united in the Forest Coalition, opposed the draft law. Their main concern was that the focus of the proposed state-owned company is on the exploitation of timber, when the forest is not just a source of timber (Sta, 2015).

4.6. Results and discussion

4.6.1. The CF organizational structure and forest management

The current organizational model of the CF has a strong hierarchical structure. This ensures the fulfilment of all tasks, however, at the same time it slows down innovation processes (I1, I5). The decision-making process starts from the Veneto Region administration as the main institution that gives directions to VA followed by the CF. Responsibility for the forest management decisions, especially regarding technical issues, is in practice delegated to the CF administration. Changes can also be initiated from the bottom of the administration chain and be approved or denied by the top management (I1, I2, I3, I4, I5, I6, I7).

The CF is currently partly subsidized by the Veneto Region and the profits gained from business activities are reinvested directly in the forest management. The employees perceive this arrangement as a beneficial for the organization (I1, I2, I4, I5, I7). The main reason is that the salaries of the employees do not depend on the organization's income. Employees are therefore not interested in increasing profit by overexploitation of resources (I4, I6). The current major source of funds in the CF is the sale of timber and concessioners' payments (e.g. concession with the Golf Club, grassland management, 16 farms and agro-tourisms, 4 restaurants – hotels and others). This situation will most probably remain in the next 5-10 years. In the short term, employees (I1, I2, I4, I7) see charges for

recently developed parking and camper sites as the main financial source for reinvestment in the development of new facilities and maintenance of the territory. Additionally, EU funds is an option for project implementation (I2, I4), especially in consortium with other European countries. This practice has been already used in the CF within the project S.Co.Re - "Sustainable and COmpetitive REsorts" between Italy and Austria, which aimed to strength the competitiveness of the tourism sector in the project area (internal documentation).

The main objectives are biodiversity protection, recreation activities, educational and scientific collaboration, timber production. These objectives are defined by the law and reflected in how the CF operates on a day-to-day basis. The objectives and their realization in practice fulfil the principles of SFM, even though some objectives are conflicting (e.g. timber production and biodiversity protection, grazing and habitat regeneration).

Biodiversity protection was recognized as the most important objective by 13 respondents (I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I15). So far, this objective is only partly achieved. It is explained mainly due to the absence of monitoring funds and issues concerning implementation of the Special Protection Area management plan and lack of control on the territory given over to concessions (I1, I6, I5).

Increase of recreation activities was recognized as an important objective by 12 respondents (I1, I2, I3, I4, I5, I6, I7, I8, I9, I11, I12, I15). It considered as one of the biggest success in the last 10 years (I2, I5, I7, I6). The CF management is actively trying to meet a social demand for recreational services by the development of tourist activities and social inclusiveness in the forest as a main priority of its management. In the last years, the forest has become more visible to society; knowledge about the territory has increased (I1, I2, I4, I5, I6). One of the biggest achievements is a prolongation of the tourist season throughout the year. This has been due to increased tourism offers, sport and cultural activities. On the negative side, from the point of view of the average tourist, especially one coming from far away, the CF lacks many facilities and the communication strategy is poorly developed (I1, I2, I4, I7). However, some projects have already been implemented and there are ongoing ones for improving the visibility of the CF and its accessibility for tourists (e.g. Cansiglio Estate, creation of a camper service, restoration of the hangar and its bunker on the former NATO base) (internal documentation and I1, I2, I3, I4, I5, I6, I7).

Timber production was recognized as an important objective by 10 respondents (I1, I3, I4, I5, I7, I8, I9, I10, I12, I15). The scope of the timber production in the CF is quite modest (see Table 4.1) in comparison to the giants of the timber industry in the EU. The CF sells all timber to private companies apart from a small amount that is used for local needs (e.g. maintain picnic areas, tourist trails). Sale of timber is based on complex contracting of forestry operations and on selling and purchase of timber for the price at the stump. The biggest timber purchaser is ITLAS-Laborlegno[20] (beech round wood over 35cm in diameter, with contracts that last 6-12 years and thus allow for medium-term planning). ITLAS mainly produces wooden flooring and

[20] This is a very ambitious business challenge that arises from a synergy between a private company and a public body. It brings profit and increased visibility to the CF; it represents positive relations with stakeholders and good communication strategy (I1, I2, I4). For ITLAS it gives not only highly valuable timber but also increases its environmental responsibility. All timber is PEFC certified and the project is a “zero-kilometre product” because the CF is located just 25 km from the ITLAS production site. This type of public-private contract can change the capacities of the public forest to receive income and to protect the forest and its ecosystem services in the long term. The official web page of ITLAS Srl - https://www.itlas.com/

furniture. The employees perceived this cooperation as one of the main successes of the CF in the last 5-10 years (I1, I2, I4).

Table 4.1: Forest management data of the CF (Italy), 2013-2015 average (data obtained from the questionnaire)

Data	The CF
Total area managed by SFMO, ha	7969
Total forest area, ha	5806.26
Total area of production forest, ha	4445.55
Growing stock, thousand m^3	1157
Total net annual increment, thousand m^3	21,289
Annual industrial round wood removals, thousand m^3 in under bark	2.5
Annual wood fuel removals, thousand m^3	4.5
Timber sold, thousand m^3	6.9
Income from the sale of timber, Mil €	0.25
Timber sold per ha of production forest, €/ha	43.7

4.6.2. Weaknesses and strengths of the current CF management

Interviewees listed strengths that help to achieve objectives of the CF management as well as weaknesses that stand on their way (see Table 4.2). The weaknesses are mainly connected to the budgetary shortage, while the opportunities appear to be the results of different activities.

Table 4.2: Weaknesses and/or strengths regarding the CF management (own elaboration based on the interviews)

Aspects	Weaknesses	Strengths
Technical issues	• Poorly developed network of hiking trails (I4, I5, I6)	• Use of a cable crane for wood hauling (I1) • Fewer bureaucratic procedures for the approval of harvesting operations (I4)
Logistics	• Too few permanent employees who can maintain the territory (I1, I4)	
Relations with stakeholders	• Lack of understanding and support from the local communities and municipalities (I1, I2) • Concessioners' agreements (I4, I1, I5) • Cimbri[21] ownership (I4)	• ITLAS agreement (I1, I3, I5, I7) • Cooperation with forest companies (I1, I4) • The Cimbri and concessioners maintain the territory (I4)
Budget	• Budgetary shortage (I1, I2, I4, I5, I6)	• Profit can be reinvested in forest management (I1, I2, I4)
Communication	• Poorly developed communication channels with tourists (I1, I2, I4, I6)	• ITLAS advertisement (I1, I3, I5) • Newsletters for stakeholders (I1, I2, I5, I7)

Technical and logistic issues. The harvesting and silviculture activities are at a very good level and completely support SFM of the CF. The recently installed cable crane for wood hauling allows the productive areas in the forest to be enlarged (I1). In addition, the CF faces fewer bureaucratic procedures concerning approval for silviculture measures in comparison to private owners (I4).

[21] The Cimbri are members of an ethnic and linguistic minority currently living in a few centres scattered in the mountainous area between the provinces of Trento, Vicenza and Verona. A small Cimbri community of recent origin is also located on the Cansiglio plateau (Belluno and Treviso provinces) (De Martin and de Savorgnani, 2014).

Conversely, technical issues concerning tourism activities have some problems. The network of hiking trails is poorly developed and existing trails are often not in good condition. This is connected to the lack of permanent employees who can constantly maintain the area and monitor the situation on the trails, picnic areas, etc.

Stakeholders. One of the main problems in the CF management is the relationship with local stakeholders, specifically the municipalities. The interviewees believe that local stakeholders do not perceive the CF as a partner but rather as a competitor. In reality with development of the CF, benefits will come to locals, for example by attracting more tourists to the area (I1, I2, I3, 14, I7). Other important stakeholders are concessioners and the Cimbri. Both seek better arrangements for their lands by having more rights over the land they use, which is not in accordance with the initial contracts. At the same time, the Cimbri and concessioners maintain the pastures and/or forest in a good sustainable way that the CF is unable to do by itself due to the budgetary shortage.

Budget. Budgetary shortage is a quite common problem for any public institution and the CF is no exception. The lack of money allocated to biodiversity protection and the development of recreational potential is particularly noticeable (I1, I2, I4, I6, I7). There is also not enough money to hire more employees. This strongly influences the maintenance of the territory. Furthermore, the staff are required to handle various tasks in addition to those for which they were originally responsible, which results in low efficiency (I4). However, this problem is supposed to be solved with the implementation of the new administrative reform in VA.

Communication. As one of the main priorities for the CF is recreation, it is important to provide information for visitors. However, the communication strategy is not well developed (I1, I2, I4, I6). This is connected to the budgetary shortage and to the limited number of employees. The reporting system is not developed. This can be explained by the voluntary nature of the reporting since the Italian governmental organizations focus solely on mandatory accounting obligations required by the Central Government (Giacomini et al., n.d.). Despite this, a long-term strategy concerning information dissemination should be adopted and integrated into the forest development strategy as public opinion should be taken into account in the decision making process regarding forestry (Kavaliauskas et al., 2015).

4.6.3. Scenarios for the CF future organizational structure development

Scenario 1 "Sale of the public land to a private organization (privatization)". In the EU, the amount of privately owned forests is increasing. In Italy itself more than 65% of the forest land is privately owned (EUROSTAT, 2011). Despite this tendency, the general belief during the interviews was that a complete privatization of the CF is highly unlikely. Employees implicitly stated that the property of the land will remain under the Region: "The presence of the state is a savior" (*Italian: Presenza dello stato e` un Salvatore*) (I1). The interviewees basically deny even a possibility of complete privatization of the forest land (from the interview: "The property of the forest lands has to be state-owned" (I2)), but not of the business activities. The environmentalists shared the same opinion about the forest land of the CF. Only two of them (I8, I12) expressed the possibility of a change of the ownership but only of the business activities. In this respect, the San Marco Hotel (owned by the Region) was recently added to the sale list of Veneto Region. This gave rise to much debate over whether it was the right decision; some employees were protesting against the decision by means of a hunger strike (Dal Mas, 2017). On the one hand, it is a good solution as a big investment

would be needed in order to restore it and the Region does not have the budget for this, while private investors are unlikely to invest unless they own the property (I4, I2). On the other hand, it can create a precedent for others, like farmers and agriculture concessioners (I2). And while a hotel (or indeed a bar or restaurant) does not really adversely impact biodiversity or nature in general, so can be in private hands with a very low risk, poorly managed farms and forest can actually create a negative impact on the environment and it is therefore more appropriate to keep them under state (Region) control (I7, I2). In fact, similarly to scholars (e.g. Karsenty et al., 2008; Koyuncu and Yilmaz, 2013) employees and environmentalists share an opinion that this scenario can cause serious damage to the forest, as well to the environment. The main argument is that typically the main aim of a private organization is profit. Therefore, the delivery of public services and environmental protection is likely to lose its relevance in comparison to timber harvest (I1, I2, I4, I6), resource overexploitation is highly possible (I9, I14, I15). Moreover, in the case of private ownership the profits from the forest would not be reinvested in forest management or development of the territory (I2, I4), but would go to the employee salaries that can stimulate an extensive land use (I1, I3, I5). For this reason, the tourism infrastructure is unlikely to be maintained, so there might be a decrease in tourists' activities. Nevertheless, a private company might create additional workplaces for the forest workers and this would satisfy local citizens (I4, I14), which is opposite to the example of privatization in New Zealand (Hall, 1997). The respondents therefore argue that sale of the CF to a private organization could have a positive influence on the productive forest area, however, it might not be an appropriate solution for the area of a high importance. Because the CF has a strong cultural and natural importance and should be treated differently from other forests (I1, I2, I3, I4, I5, I6, I7). Indeed, in the example of a quite successful privatization process of forest land in New Zealand, one of the "lessons" from the process was "lands critical for recreational, aesthetic, or habitat values should remain publicly owned" (Hall, 1997, p. 181).

Scenario 2 "Creation of a company under a state control"[22]. In the case of the CF this scenario was evaluated as almost impossible (I1. I2, I3, I4, I5, I6, I7, I11, I15). The main reason is an insufficient resource base that will not generate adequate profit for the functioning of a company. With the forest resources that the CF has, it can only function properly using governmental/regional subsidies (I5, I4, I7). In fact, if we look at countries with strong SFMOs (e.g. Norway, Finland), their forest sector is much stronger than in Italy[23]. The total area of the CF of forest can barely be compared to other commercially oriented SFMOs (e.g. the CF (Italy) – 5.8 thousand ha, Statskog (Norway) – 1007 thousand ha, Metsähallitus (Finland) – 12538 thousand ha). At the same time, we can see on the examples of other SFMOs, such as for example ÖBF (Austria), Hrvatske šume (Croatia), RMK (Estonia), Metsähallitus (Finland), there are many sources of income other than timber. Among them are recreational activities, which are expected to increase in the near future in the CF, renewable energy sources, consulting, game and others (more in Table 5 in Liubachyna et al., 2017). In the future, PES should become a source of income for the CF (I1, I3, I4, I6, I7). Services and activities

[22] One of the employees (I7) suggested an amended version of this scenario. The idea is that the model of publicly owned forest can be used as a role model for other owners. There is a possibility to create a so-called forest consortium or state company – "a greater Cansiglio" (meaning to increase the area of the CF by adding other forests of VA and small municipal forests). The "a greater Cansiglio" could be a more effective management unit than the current one thanks to an increased resource base combined with a high technical knowledge of the employees of VA and the current CF; additionally it can be a consultancy body and technical support for private forest owners.

[23] In 2015 the roundwood production in Finland was 59,411 thousand m^3, in Norway this was 11,376 thousand m^3, while in Italy it was only 5,052 thousand m^3 (EUROSTAT, 2017)

that take place in the CF cause environmental damage (externalities) that have not been considered up to now. As one of the interviewees stated: "Who comes here has to understand that he/she creates pressure on the territory and its environment and has to contribute to preserve it" (I2). Therefore, charging an entrance fee or a value added to the products from the CF will help to restore the natural balance in the forest and develop the recreational potential of the CF (I2). In fact, the study of Gatto et al., (2013) on the possibility of PES implementation in Veneto Region (where the CF is located) confirms that people are willing to pay for recreation as well as for C-sequestration but not for biodiversity conservation, landscape and other ecosystem services. These results present only a theoretical willingness, therefore public institutions should promote policy actions to increase the general awareness of forest-related ecosystem services (Gatto et al., 2013). These additional sources of income can positively influence on the hypothetical company in case of the scenario implementation, but also on the development of the local territory and increase awareness of ecosystem services that was also highlighted by the environmentalists (I8, I9).

Scenario 3 "Long-term concessions in favor of a Non-Governmental Organization (NGO)". Based on the literature review (e.g. Wright and Andersson, 2013; Cronkleton et al., 2012; Matose, 2006; White and Martin, 2002; Pretty and Ward, 2001) we can argue that the CF is not a typical case for NGO involvement, this was also confirmed during interviews (I2, I4, I7). At the same time, some employees did not entirely discount this possibility either (I2, I4, I6). Notwithstanding, their main concern about this scenario was an excessive protectionism of the area that will not benefit anyone (I1, I5, I4, I7). The other concern about this scenario is the possibility of a big international NGO taking charge of the forest and the potential for revenue from tourists being allocated to other international projects (I2). And while in the first case literature indicates that this is not a major concern, in the second case studies show a risk (e.g. Cronkleton et al., 2012). Overall, this scenario can be advantageous for the environment and consequently the environmentalists evaluated this scenario positively, but its positive influence on the economic development of the territory is doubtable.

A general observation is that it was more difficult for CF employees and environmentalists to judge and evaluate scenario 3 compared to other scenarios. The implementation of this scenario typically includes the involvement of stakeholders, interactions between public entities/public administration (Region/State) and representatives of the civil society (NGOs). But VA is a hierarchical organization and it has just a few interactions between the public and the private organizations (not business-oriented), it lacks the trust of stakeholders and communication strategies for this collaboration. Therefore, this scenario has not been considered to date.

Scenario 4 "Long-term forest concessions signed by private enterprises". The majority of the employees positively evaluated this possibility as an option for the CF (I1, I3, I4, I5, I7). The environmentalists gave a positive (I8, I9, I11, I12, I14) or neutral (I10, I13) evaluation. One even said that it is what they actually want for the CF (I15). In this scenario, the situation will remain the same or from an economic point of view can even be improved. Overall the scenario had a positive evaluation, as the symbiosis of the CF with the concessioners and private companies can be beneficial for both if it is well-regulated and the contracts are clearly defined with the possibility of reshaping agreements due to major changes in the legislation as it is highlighted in the literature as well (Amacher, 2006; Karsenty et al., 2008). Therefore, no negative impacts are expected, as concessioners will be controlled by a public authority, i.e. the Region. Another positive aspect is that the CF will receive the concession

payments straight away and can plan different activities for the following years (I4). A study in another Italian Region – Liguria, confirms that integration between public and private initiatives can be effective in the promoting of forestry business in rural areas with a responsible approach to deliver public goods in the forest sector (Sturla, 2012).

4.7. Conclusions

The CF administration has clear objectives and vision for the next 5-10 years. We can observe its multifunctional and diversified goals in maintaining its strong historical heritage of timber production together with the development of new services. Specific attention is given to recreational activities as there is an increased demand from society for ecotourism and outdoor recreation.

One of the big advantages the CF administration has is the opportunity to reinvest profit gained from economic activities directly for the purpose of forest management, a very positive accomplishment. However, better financing will allow problems such as a lack of staff to be solved and to implement innovative approaches in the management of the area.

From the scenarios evaluation it became evident that such a drastic change as presented by scenario 1 "Sale of the public land to the private organization" seems very unlikely for the CF in the near future as well as in the long term. This is connected with a high cultural and ecosystem values of the forest and employees as well as environmentalists want to ensure a proper use of the forest for social benefits. Scenarios 2 "Creation of a company under state control" did not get a lot of support due to the lack of timber resources in the CF. However, with additional non-wood business activities and an increasing attention to PES and its high potential in the area of research, there is potential for the implementation of this scenario. Scenario 3 "Long-term concessions in favor of an NGO" gave rise to concerns of possible overprotection of the area. At the same time the scenario 4 "Long-term forest concessions signed by private enterprises" was positively evaluated both by the employees and the environmentalists. The CF is already actively using concessions for different business activities and engaging private actors into projects.

It is important to remember that the CF is a rather unique case of public forest due to its high cultural and historical significance. Therefore, before taking any further decisions on how to proceed with restructuring of the CF, i.e. moving towards a privatization process or remaining under the direct control and responsibility of the regional public authority, it is necessary to collect more information and to evaluate the overall situation in the area. In particular, it is important to understand the perception of stakeholders and their willingness to collaborate. Thus, the CF should leverage its external influence by co-creating value with stakeholders in society and driving growth, linked to its purpose, mission and strategic objectives. Co-operation with local municipalities and communities can truly become a catalyst for positive changes in the area.

4.8. References

323-01/15-14/59, N., 2016. ZAKON O GOSPODARJENJU Z GOZDOVI V LASTI REPUBLIKE SLOVENIJE (ZGGLRS). doi:10.1017/CBO9781107415324.004

Agrawal, A., Chhatre, A., Hardin, R., 2008. Changing governance of the world's forests. Science (80). 320, 1460–1462. doi:10.1126/science.1155369

Amacher, G.S., 2006. Corruption: a challenge for economists interested in forest policy design. J. For. Econ. 12, 85–89.

Bastrup-Birk, A., Reker, J., Zal, N., 2016. European forest ecosystems: State and trends, EEA Report. doi:10.2800/964893

Buttoud, G., 2000. How can policy take into consideration the "full value" of forests? Land use policy 17, 169–175. doi:10.1016/S0264-8377(00)00015-6

Cantarello, E., Newton, A., 2008a. Towards cost-effective indicators to maintain Natura 2000 sites in favourable conservation status. Preliminary results from Cansiglio and New Forest. IForest 1, 75–80. doi:10.3832/ifor0410-0010075

Cantarello, E., Newton, A.C., 2008b. Identifying cost-effective indicators to assess the conservation status of forested habitats in Natura 2000 sites. For. Ecol. Manage. 256, 815–826. doi:10.1016/j.foreco.2008.05.031

Carbone, F., Savelli, S., 2009. Forestry programmes and the contribution of the forestry research community to the Italy experience. For. Policy Econ. 11, 508–515. doi:10.1016/J.FORPOL.2009.06.001

Chang, H., 2007. State-Owned Enterprise Reform, Policy notes in United Nations Department of Social and Economic Affairs (UNDESA). New York, NY, USA.

Cronkleton, P., Saigal, S., Pulhin, J., 2012. Co-management in community forestry: How the partial devolution of management rights creates challenges for forest communities. Conserv. Soc. 10, 91. doi:10.4103/0972-4923.97481

Dal Mas, F., 2017. Sciopero della fame contro la vendita dei beni del Cansiglio - Cronaca - Corriere delle Alpi [WWW Document]. Corr. delle Alpi. URL http://corrierealpi.gelocal.it/belluno/cronaca/2017/08/24/news/sciopero-della-fame-contro-la-vendita-dei-beni-del-cansiglio-1.15768303 (accessed 10.20.17).

De Martin, L., de Savorgnani, V., 2014. The Cansiglio Forest. Padua, Italy.

Drábková, A., 2013. Tourists in Cansiglio forest, Italy: Case study about forests visitors and their opinions. Hum. Geogr. 7, 35–43. doi:10.5719/hgeo.2013.72.35

EUROSTAT, 2017. Forestry statistics in detail - Statistics Explained [WWW Document]. URL http://ec.europa.eu/eurostat/statistics-explained/index.php/Forestry_statistics (accessed 8.19.15).

EUROSTAT, 2011. Forestry in the EU and the world — A statistical portrait. Publications Office of the European Union, Luxembourg city, Luxembourg. doi:10.2785/13022

EUSTAFOR, 2016. Managing State Forests in Europe, European State Forest Association. Brussels, Belgium.

Gatto, P., Pettenella, D., Secco, L., 2009. Payments for forest environmental services: Organisational models and related experiences in Italy. IForest 2, 133–139. doi:10.3832/ifor0504-002

Gatto, P., Vidale, E., Secco, L., Pettenella, D., 2013. Exploring the willingness to pay for forest ecosystem services by residents of the Veneto Region. Bio-based Appl. Econ. 3, 21–43. doi:10.13128/BAE-11151

Giacomini, D., Mazzoleni, M., Rocca, L., Carini, C., n.d. Trends in the Sustainability Reporting in Italian LGOs: Better Stick or Carrot? doi.org. doi:10.20944/preprints201709.0025.v1

Hall, O.F., 1997. Discussion Paper: New Zealand's privatization of forest lands: policy lessons for the United States and elsewhere? For. Sci. 43, 181–193.

Kant, S., 2009a. Recent global trends in forest tenures. For. Chron. 85, 849–858.

Kant, S., 2009b. Sale of Canada's public forests: Economically non-viable option. For. Chron. 85, 841–848.

Karsenty, A., Drigo, I.G., Piketty, M.G., Singer, B., 2008. Regulating industrial forest concessions in Central Africa and South America. For. Ecol. Manage. 256, 1498–1508. doi:10.1016/j.foreco.2008.07.001

Kavaliauskas, M., Linkevičius, E., Jonikavicius, D., Kokankaitė, K., 2015. Public opinion analysis on state forest management: study area in Kaisiadorys municipality, in: Raupelienė, A. (Ed.), Proceedings of the 7th International Scientific Conference Rural Development. pp. 4–10. doi:10.15544/RD.2015.031

Koyuncu, C., Yilmaz, R., 2013. Deforestation, corruption, and private ownership in the forest sector. Qual Quant 47, 227–236. doi:10.1007/s11135-011-9513-2

Krott, M., 2008. Forest government and forest governance within a Europe in change, in: Cesaro, L., Gatto, P., Pettenella, D. (Eds.), The Multifunctional Role of Forests: Policies, Methods and Case Studies. EFI Proceedings, pp. 13–27.

Larsen, P. V., Brukas, V., 2000. Scenarios for the future Lithuanian state forest sector. Balt. For. 6, 29–40.

Liubachyna, A., Bubbico, A., Secco, L., Pettenella, D., 2017. Management Goals and Performance: Clustering State Forest Management Organizations in Europe with Multivariate Statistics. Forests 8. doi:10.3390/f8120504

Marchiori, E., Sturaro, E., Ramanzin, M., 2012. Wild red deers (Cervus ela-phus L.) grazing may seriously reduce forage production in mountain meadows. Ital. J. Anim. Sci. 11, 47–53. doi:10.4081/ijas.2012.e9

Matose, F., 2006. Co-management options for reserved forests in Zimbabwe and beyond: Policy implications of forest management strategies. For. Policy Econ. 8, 363–374. doi:10.1016/j.forpol.2005.08.013

Millennium Ecosystem Assessment, 2005. Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC., USA.

OECD, 2005. Corporate governance of state-owned enterprises. A Survey of OECD countries. OECD, Paris, France.

Pettenella, D., Secco, L., 2004. New trends in Italian forest policies: a shift of the focus from mountains to plains, in: Buttoud, G., Solberg, M., Tikkanen, I., Pajari, B. (Ed.), The Evaluation of Forest Policies and Programmes. EFI Proceedings, pp. 55–63.

Pettenella, D., Vidale, E., Gatto, P., Secco, L., 2012. Paying for water-related forest services: A survey on Italian payment mechanisms. IForest 5, 210–215. doi:10.3832/ifor0626-005

Pettenella, D.S.L.S.L., 2013. Istituzioni forestali del Nord Italia. Razionalizzazione o destrutturazione? Sherwood – For. Ed Alberi Oggi 194, 5–10.

Pretty, J., Ward, H., 2001. Social capital and the environment. World Dev. 29, 209–227.

PricewaterhouseCoopers, 2015. State-owned enterprises catalysts for public value creation? [WWW Document]. URL https://www.pwc.com/gx/en/psrc/publications/assets/pwc-state-owned-enterprise-psrc.pdf (accessed 12.10.17).

Regione del Veneto, 2014. Lo sviluppo rurale in Veneto – Schede informative 2014.

Sabogal, C., Guariguata, M.R., Broadhead, J., Lescuyer, G., Savilaakso, S., Essoungou, N., Sist, P.F., 2013. Multiple-use forest management in the humid tropics: opportunities and challenges for sustainable forest management (No. 173), FAO Forestry Paper. Rome.

Secco, L., Favero, M., Masiero, M., Pettenella, D.M., 2017. Failures of political decentralization in promoting network governance in the forest sector: Observations from Italy. Land use policy 62, 79–100. doi:10.1016/j.landusepol.2016.11.013

Šoštarič, M., 2016. Delo [WWW Document]. DZ sprejel Zak. o državnem gozdarskem Pod. URL http://www.delo.si/gospodarstvo/kmetijstvo/dz-sprejel-zakon-o-drzavnem-gozdarskem-podjetju.html (accessed 10.20.17).

Sotirov, M., 2014. A policy and institutional analysis of forest sector reforms in Central and Eastern Europe.

Sta, B.S., 2015. Demokracija [WWW Document]. Zak. o gozdarskem Pod. koalicijsko neusklajen. URL http://www.demokracija.eu/slovenija/politika/8788-turk-slovenija-potrebuje-voditelja-ki-je-sposoben-garantirati-temeljno-pravinost-v-drubi (accessed 10.20.17).

Sturla, A., 2012. Public-Private Partnership as a way to restore forest management. Some evidence from Liguria. L'Italia For. e Mont. 299–309. doi:10.4129/IFM.2012.3.08

Varcholova, T., Beslerova, S., 2013. Ownership structure and company performance: Research and literature review. e-Finanse Financ. Internet Q. 9, 24–33.

Veneto Agricoltura [WWW Document], 2017. URL http://www.venetoagricoltura.org/ (accessed 9.22.17).

White, A., Martin, A., 2002. Who Owns the World's Forests? Forest Tenure and Public Forests in Transition. Forest Trends, Center for International Environmental Law, Washington, DC, USA.

World Bank, 2005b. State forest enterprise reform in Vietnam : review of policy and implementation framework for Decree 200 - technical note. Washington, DC, USA.

World Bank, 2005a. Forest Institutions in Transition: Experiences and Lessons from Eastern Europe. Washington, DC, USA.

Wright, G., Andersson, K., 2013. Non-Governmental Organizations, Rural Communities and Forests: A Comparative Analysis of Community-NGO Interactions. Small-scale For. 12, 33–50. doi:10.1007/s11842-012-9206-2

Wunder, S., 2006. Payments for environmental services: Some nuts and bolts. (No. 42).

Yin, R.K., 2009. Case Study Research. Design and Methods, 4th ed. Sage Publications, Thousand Oaks.

Zhang, Y., Wildemuth, B., 2006. Unstructured interviews [WWW Document], (accessed 27.01.18).

Chapter V

Conclusions

This work underlines the complexity of organizational structures and management models implemented by SFMOs. In the study, SFMOs were selected by the criteria of membership in EUSTAFOR. They share common characteristics as being state owned and manage forest resources. But their other characteristics present a diverse spectrum of SFMOs influenced by external (e.g. the institutional framework where they operate, by natural conditions, relations with stakeholders, etc.) and internal (e.g. organizational model, set priorities, etc.) factors. Literature also underlines a prominent emerging organizational phenomenon characterized by an involvement of different types of organizational partners and a complex set of organizational governance models, routines, and objectives.

Conclusions to the thesis work are presented following three specific objectives: (i) to analyze the reporting systems of SFMOs in terms of sustainable forest management and corporate responsibility (Chapter II); (ii) to make a comparative overview of SFMOs in the European forest sector context with a specific focus on the way they prioritize the three pillars of sustainable forest management: ecological, economic and social (Chapter III); (iii) to describe and discuss the current management model and possible scenarios of the future organizational development in one case study, the Cansiglio Forest in, Italy (Chapter IV). At the end, some general observations and concluding remarks are suggested.

Chapter II of the dissertation analyzed the reporting system of the selected SFMOs and information that can be obtained from the reports. As discussed also in Chapter I (section 1.9.), SFMOs need to be open and transparent about their activities and performance and contribute to a better understanding of forestry by non-experts and the public in general. A reporting system is a good tool to pursue these goals, as it helps to collect and synthesize relevant information into a short and easy to read format providing the general public with an overview of the overall performance of the SFMO. However, in most cases the reporting is partial and incomplete, some SFMOs have not introduced the reporting system for public in their management at all. The result is a gap between expected information disclosure by SFMOs and the limited information actually disclosed. Few SFMOs are correctly using the reporting tools. They provide annual reports, which is a positive tendency. Only 9 SFMOs out of 33 EUSTAFOR members have reports in English and only 7 of those published Integrated or Sustainability reports. However, even SFMOs that produce reports do not apply a common framework for their reports. Some of them produce annual reports, integrated reports, sustainability reports, etc., and each of them are framed as individual elements, not in the context of a broader sustainability framework. Our analysis of their reporting systems showed, for example, that only one SFMO – Sveaskog (Sweden) – follows the Global Reporting Initiative (GRI) guidelines, which are the international recognized reporting scheme. Most reports have a specific focus only on economic and financial aspects and silvicultural data. As they currently stand, the reporting systems of SFMOs do not provide a holistic overview of the all pillars of sustainable development. The social aspect is generally not taken into account with the exception of a few SFMOs. This includes relations with stakeholders, impacts on local communities and working conditions for employees (e.g. data about injuries, health training, etc.). The overall conclusion is that a majority of European SFMOs are not accountable to the public.

In Chapter III of this work the focus was specifically on how SFMOs incorporate pillars of SFM (economic, social and environmental) into their management objectives and practices. Results of the cluster analysis show three clusters of SFMOs and three outliers. The Cluster 1 "SFMOs with diversified goals" represented by the organizations with a profit-oriented forestry and diversified business portfolio, some areas of the SFMOs have a strong emphasis on ecosystem service delivery. Cluster 2 "SFMOs—protectors of public interests" presents service-oriented SFMOs; they are mainly subsidized by the government as profit is not their main goal. Cluster 3 "Profit-oriented SFMOs" represents SFMOs with a profit-oriented goal. Outlier 1 (Romsilva) and Outlier 3 (LČR) are show similarities with Cluster 3. Outlier 2 (Veneto Agriculture) is close to Cluster 1. The existence of diverse SFMO clusters shows the possibility of different approaches to SFM with a focus on different goals (e.g., generating profit, public service delivery). These results correspond with a categorization of different approaches to sustainability challenges in different countries given in the Chapter I. In both cases, there are several ways to SFM depending on management priorities and overall situation in the sector of the country. Further exploration of different approaches to SFM and their contribution to sustainable transformation is urgently required. Nevertheless, the attempt to cluster SFMOs on the basis of their prioritization of the pillars of SFM has enabled fruitful reflection on similarities, differences, advantages and shortcomings of their management. Such reflection can stimulate policy learning about SFMOs' management.

Following the aim of the third specific objective, the analysis of a case study of an example of an SFMO on the local level is presented in the Chapter IV. In this work, I looked in detail at Outlier 2 of cluster analysis (Veneto Agriculture (Italy), specifically one of its units – the Cansiglio forest) that is similar in its characteristics to Cluster 1 (cluster with diversified goals). The focus is on the changes that might happen in the management of the CF in the future. The changes are triggered by the reform of VA itself, budgetary shortcuts that limit possibilities for the development of the CF, new demands of the society towards ecosystem services, etc. These factors together are generating a need for a new, diversified forest management approach. Therefore, four alternative scenarios were proposed based on the literature review: Scenario 1 "Sale of the public land to a private organization"; Scenario 2 "Creation of a company under state control"; Scenario 3 "Long-term concession in favor of a Non-Governmental Organization"; Scenario 4 "Long-term forest concessions signed by private enterprises". Even though that it is noticeable that the CF management is moving towards privatization and using instruments from the private sector in order to develop some activities and services, Scenario 1 was poorly received by the interviewees. The CF will most probably remain under public ownership (according to the perception of interviewees) in the long-term. In this case, it gives increased assurance that the forest will continue to provide those key public services that are more and more relevant for society (e.g., recreation, biodiversity, landscape protection, etc.) following the principles of SFM. Scenario 2 and Scenario 3 received a mixed reaction among those interviewed, with concerns around the potential to be profitable (Scenario 2) and around overprotection (Scenario 3). Scenario 4 is perceived as the most plausible for the future of the CF.

To conclude, a few general observations about SFMOs in Europe can be made. SFMOs covered in the work appear to have adopted different organizational models in their management. Each single SFMO has its own characteristics, but if we look at the overall picture of SFMOs in Europe, we can distinguish some common tendencies. Firstly, most SFMOs are owned by the state however they use

different private sector instruments and help (e.g. concessions, outsourcing). It is closely connected to the fact that SFMOs mainly decide to separate functions of supervision and management between different institutions. Therefore, supervision is often performed by a state authority (e.g. Ministry) and management by the SFMO itself, which can have different forms and models (e.g. Joint stock company owned by the State - Coillte (Ireland); State enterprise - Metsähallitus (Finland), Profit-making State agency governed by the Ministry of Environment - RMK (Estonia), etc.). SMFOs often opt for the corporatization of their activities and engage the help of private companies to perform some activities. Therefore, there is an increase in outsourcing of activities, especially in silviculture and harvesting operations and a consequent reduction of SFMOs' personnel. Additionally, the recent increase of attention to the environmental and social dimensions of SFM requires SFMOs to be innovative in the management of their property, and change their business settings more proactively, with the possible use of environmental services and social inclusiveness as new business opportunities (e.g. development sources of renewable energy, recreation facilities, etc.). Given its heavy dependence on natural resources, the forest sector is at the frontline of sustainable development. The ongoing major structural change has triggered the need for SFMOs to develop new resources and capabilities that sustain their current and future competitiveness (e.g. consulting and rental property services). However, SFMOs have currently a low level of information disclosure. This is explained by poorly developed reporting practices and low application of GRI guidelines, which is limiting their capacity to interact in a more positive way with the public and get more visibility and acceptability of their management practices and their potential role in contributing to protect and enhance forest resources and related ecosystem services.

In order to find a better balance between the competing demands on Europe's forests, different management approaches/models may be required. A SFMO management model in one country may be an important catalyst for reforms and changes in the other countries; however, they are not directly transferable and have to be interpreted in the political and socioeconomic context of the recipient country. The existence of one single, "best model" of organization is highly unlikely and also might be insufficient for success due to the different institutional and natural conditions. At the same time an SFMO in each country can act as a role model for private owners in the country, especially in new democracies where restitution and re-privatization has produced a large number of small private owners who often do not have the necessary skills and capacity for SFM. Moreover, they can act as a hub for innovation activities, introduction of scientific forestry practices and development of new business ideas that can later be implemented by other forest organizations. Additionally, there is an urgent need for improvement of the reporting and communication systems in SFMOs. Being proactive in disclosing data about organization activities or adopting leading reporting standards such as the GRI can significantly increase a company's credibility to stakeholders, especially the public.

Literature published to date has generally paid little attention to state forest ownership, despite the relevance of the state sector and the importance of understanding its management and performance. During my research and in compiling this study, the principle difficulty I encountered was the scarcity of data. The lack of a wider range of explanatory variables and more comprehensive data sets were the major obstacles to a broader analysis. The data also gives a limited vision of the SFMOs' performance, since many activities and results may be true to the organization's reality, but were simply not reported or not made explicit in the documents.

For future research, there is a need to explore the topic of state forest ownership and management as state forests have been playing such a vital role in the forestry sector of European

countries. The results of this dissertation also provide avenues for prospective future work. Future studies should explore in detail SFMOs' practices, their achievements and failures; changes in response to new demands from society and those factors associated with different performances and outcomes. Specifically, it will be useful to have more case studies about SFMOs in different countries and their management practices; to conduct a detailed analysis of various management models and to develop a common reporting system that can be approved at least at regional level specifically for the organizations working in the forest sector.

Despite the limitation, the research brings interesting insights to both academics and practitioners. The dissertation is a valuable contribution to the existing literature on the state-owned forest sector and its performance; it enriches the knowledge of possible organizational models in the forest sector and their implications for SFMOs in Europe, points out the area for empowerment about reporting systems by SFMOs highlighting the indicators that are not covered in the reports.

Annexes

Annex 1: Questionnaire to SFMOs

Questionnaire

Topic: State Forest Management Organizations in Europe

This questionnaire has been compiled for the development of a PhD thesis by Anna Liubachyna, a PhD student at the University of Padova. Dept. TESAF. PhD Program Land. Environment. Resources and Health (L.E.R.H.), director of Program: prof. D. Pettenella, supervisor: prof. L.Secco

The main focus of the research is around State Forest Management Organizations (SFMOs), their structure, performance, policy involvement, and response to institutional changes within their respective countries and generally in Europe.

One component of the research is dedicated to the evaluation of SFMOs` performance. Therefore, one of the specific objectives is to develop a set of indicators, which will allow benchmarking analysis among SFMOs, and after to identify/describe the best practices. For this purpose, we would like to collect data about SFMOs` current performance in different areas like forest management, finance, environmental issues, and social responsibility. The collected data will be used only for the purposes of the research. Before any publication, a preliminary version of the results will be sent to the respondents and to EUSTAFOR office, highlighting the aggregated results in order to allow for a benchmark analysis.

Instructions: please fill in the missing data and answer the questions. You can do it in the word file or if you prefer, print it first, fill it in by hand and scan afterwards. We would kindly ask you to send it back by email to **liubachynaanna@gmail.com** , deadline: 24 December. 2016.

General information

Country	
State Forest Management Organization	
Name and position the respondent (e.g.: director. secretary. manager. forester. ….)	

Part 1 – Forest management

1. Please fill in the following table:

Data	**2013**	**2014**	**2015**
Total area managed by SFMO. thousand ha			
Total forest area. thousand ha			
Total area of production forest[24]. thousand ha			
Growing stock. thousand m^3			
Total net annual increment. thousand m^3			
Annual industrial round wood removals[25]. thousand m^3 in under bark			
Annual wood fuel removals[26]. thousand m^3			
Forest damaged area (total of damages by pests. fires. storm/wind. avalanches. human induced. etc.). % Please select range:			

[24] Forest area designated primarily for production of wood, fibre, bio-energy and/or non-wood forest products (FAO).

[25] The wood removed for production of goods and services other than energy production (wood fuel) (FAO).

[26] The wood removed for energy production purposes, regardless whether for industrial, commercial or domestic use (FAO).

• less than 5% • 5-20% • 20-50% • more than 50%			

2. Do you own/manage any sawmills or other processing plants?

Yes		No	

If yes. how many sawmills does the enterprise own? What is the processing capacity of sawmills (m^3/year)?

_____

_____

_____

3. How is the timber harvest organised? Is the timber harvest performed by contractors, SFMOs employees or both (please include a %)?

_____

_____

_____

Additional comments:

_____

_____

_____

Part 2 – Financial aspects

1. Please fill in the following table:

Data	**2013**	**2014**	**2015**
Assets in total. Mil €			
Turnover. Mil €			
Annual profit (after taxes). Mil €			
Expenditure for services. Mil €			
Total Investments. Mil €			
Timber sold. mil m^3			
Income from the sale of timber. Mil €			
Market share of the national supply of industrial round wood. % Please select range: • less than 10% • 10 – 25% • 25 – 50% • more than 50%			
Amount of reinvested money for the purpose of forest management (e.g. forest amelioration and forest protection works. new plantations and infrastructures). Mil €			
Amount of money paid annually to the state budget (rental fee. dividends. etc), not including taxes. Mil €			

2. Have you had any significant changes in the financial performance of SFMO in the last 10 – 15 years? Please, explain your answer

_____

_____

_____

3. Have you implemented any changes in your business activities or portfolio (e.g. development of new business areas or scaling back of non profitable activities) in the last 10 – 15 years? Please, explain your answer

_____

_____

_____

4. Do you perform any non-timber business activities?

Non-timber business activity	No	Yes	
		Managed directly	Managed through contract/concessions to other organizations (please specify)
Fishing			
Game			
Renewable energy plants			
Real estate			
Consulting			
Nursery			
Extraction of natural recourses			
Non-wood forest products			
Tourism			
Other (please specify)			
Other (please specify)			

Please list the 3 most profitable non-timber business activities and the percentage corresponding to their part in the profitability of the enterprise:
1. …… - ____%
2. ……... - ____%
3. …… - ____%

5. Do you have a risk strategy or risk policy (dealing with unpredictable situations or natural hazards)?

Yes		No	

If yes, what is the percentage of budget allocated for the risk management fund (money allocated in the budget for dealing with unpredictable situations or natural hazards)? Please specify the average for the period 2013-2015
_____%

6. Do you manage only state land? Or are you also contracted to manage private land or land of municipalities?

_____

_____

_____

Additional comments:

_____

_____

_____

Part 3 – Environmental protection aspects

1. Please fill in the following table:

Data	**2013**	**2014**	**2015**
Protected areas. thousand ha			
Protected forest. thousand ha			
Expenditure on nature protection. % of annual turnover			
Area focused on soil or water protection. % to a total area of SFMO			
Forests available and managed for public recreation and tourism. % to a total area of SFMO			
Certified forest. % to total forest area			
Certified removals. thousand m^3 or % to total removals (please specify)			

Additional comments:

_____

_____

_____

Part 4 – Social responsibility and public relations aspects

1. Please fill in the following table:

Data	**2013**	**2014**	**2015**
Full time employees. #			
Seasonal employees. #			
White collar employees. #			
Gender ratio. female %			
Accidents during work for employees. #			
Number of technical training hours per employee. average			
Number of health and safety training hours per employee. average			
Number of tourist visits. mil #			
Cultural heritage sites. #			

2. How can different stakeholders participate into decision making process?

_____

_____

_____

3. Does population have a free access to non-wood forest products (e.g. mushrooms and berry picking) in the SFMO`s land?

Yes		No	

If yes. are there any restrictions?

_____

_____

_____

Additional comments:

_____

_____

_____

The collected data will be kept strictly confidential, and used only for the purpose of the PhD research activity in an aggregated way. If you are interested, a synthesis of our results and/or a PDF copy of the PhD thesis can be sent to your organization as soon as available.

Thank you for your kind collaboration!

Annex 2a: Questionnaire to follow for the semi structure interview with employees of Veneto Agricultura and the Cansiglio Forest (English version)

Questionnaire for Veneto Agricoltura (VA) and Cansiglio Forest (CF)

Name of interviewee	
Professional qualification/position	
Work experience in VA or CF	
Date and location of the interview	

Theme: Priorities and goals of the management

The main objective of the section is to identify what is the focus of CF management and to define its future expectation.

1. According to your knowledge what are the main priorities of the current forest management in CF as defined by laws and rules? Please explain your answer.

   Please rank them (0 – not applicable. 1 – the least important. 2 – important. 3 – the most important)

Priorities		**Rank**
Timber production		
Ecosystem services (from CICES classification)	Biomass	
	Grazing	
	Watershed management	
	Flood protection	
	Soil protection	
	Storm protection	
	Ventilation and transpiration (fresh air)	
	Biodiversity	
	Pest control	
	Recreation activities	
	Sacred and/or religious importance	
	Educational and scientific importance	
All are equally important		
Other		

_____

_____

_____

2. Are these priorities reflected in how CF operates on a day-to-day basis?

_____

_____

_____

2.1. Do you think that the priorities should be different from those currently prescribed by the law?

Yes ☐ No ☐ I do not know ☐

If yes. what should they be?

_____

_____

_____

3. According to your knowledge what are the established future goals for the management of CF (in 5-10 years)?

_____

_____

_____

Theme: Outcomes of the management

The aim of the section is to reveal the actual results of the CF management and to see how they correlate with the claimed goals.

4. What are the expected outcomes arising from current CF management initiatives? To what extent are they achieved? Please explain your answer

	Outcomes	Achieved	Partly achieved	Not achieved	I do not know
4.1					
4.2					
4.3					
4.4					
4.5					

_____

_____

_____

5. What are the expected outcomes of the CF management as planned in the next 5-10 years? Please explain your answer in details

_____

_____

_____

5. 1. According to your opinion what should be the main outcomes for CF in the next 5-10 years?

_____

_____

_____

6. Do you have any problems and/or positive aspects regarding the way the forest is managed in connection to ….? Please explain your answer

		Problems	**Positive aspects/opportunities**
6.1	...technical issues		
6.2	…logistic		
6.3	…relations with stakeholders		
6.4	…budget		
6.5	…communication		
6.6	other		

_____

_____

_____

7. How do you currently use the outputs of productive forest area in CF? Please explain

Profit delivery for the state budget/VA budget	
Profit delivery for reinvesting into forest management	
Maintain forest ecosystem for better delivery of ecosystem services (e.g. soil protection. watershed management)	
Other	

_____

_____

7.1 Will the outputs of productive forest area change in the future (5-10 years)?

Yes ☐ No ☐ I do not know ☐

_____

_____

_____

8. What do you think is the biggest success in the management of CF in the last 5-10 years?

_____

_____

_____

9. What do you think is the biggest failure in the management of CF in the last 5-10years?

_____

_____

_____

10. How do you see the future CF? In the real world (i.e. what do you think it will likely to happen?) and in a perfect world (i.e. what do you dream it will happen?)?

_____

_____

_____

Theme: Management model

With a help of this section we would like to understand how the CF is managed from an organisational point of view. It will help to categorize different ways of managing State forest organizations. to compare their pros and cons at the European scale.

11.Could you please briefly describe the current decision made process regarding the management of CF?

_____

_____

_____

11.1 Who has right to make the ultimate decision on…?

	…budget of CF	… forest management of CF	… administrative issues of CF
Central government			
Veneto Region			
Veneto Agricoltura			
Cansiglio Forest administration			
Others			

_____

_____

11.2. What stakeholders have the capacity to influence on decisions regarding CF management? Could you please rank them due to the capacity to influence on decisions (0 - not applicable. 1 – low capacity. 2 – medium capacity. 3 – high capacity)

Political parties(please specify)		Environmentalists (please specify)	
Farmers Associations (Associazioni di Categoria: CIA. Coldiretti. Confagricoltura		Residents of forest mountain areas	

Farmers		Civil Society that use forests	
Hunters Associations (please specify)		Scientific society	
Hunters		Others	

_____

_____

12. Do you think that the current organisational model is properly working with respect to the planned outcomes?

If yes, what is the key factor for the success?

Yes ☐ No ☐

If not, what can be improved or changed? How?

_____

_____

_____

13. Currently CF is partly subsidized by region and has some profit from timber sales that is reinvested for the needs of CF. Are you satisfied with this arrangement?

Yes ☐ No ☐

If yes, what are the reasons you are satisfied?
If no, what would you like to change?

_____

_____

_____

13.1. What do you think will be the main sources of funding in the next 5-10 years for CF? And in the long term perspective (50 years)?

_____

_____

_____

14. CF is public owned. Do you expect any changes of ownership of CF in the next years? Could you please explain your answer?

	Short term (5-10 years)		**Medium term (10-30 years)**		**Long term (more than 30 years)**	
	Forest	Commercial activities	Forest	Commercial activities	Forest	Commercial activities
Remain under state ownership						
Long-term concession to other public authorities						
Long-term concession to private organisations						
Privatisation						
I don't know						

_____

_____

_____

14.1 CF is state owned. According to your opinion, what changes of ownership of CF should be in the next years? Could you please explain your answer?

	Short term (5-10 years)		**Medium term (10-30 years)**		**Long term (more than 30 years)**	
	Forest	Commercial activities	Forest	Commercial activities	Forest	Commercial activities
Remain under state ownership						
Long-term concession to other public authorities						
Long-term concession to private organisations						
Privatisation						
I don't know						

_____

_____

_____

15. What would change (see the Table below) if the ownership of CF were different? Please explain your answer

	For the forest	**For the environment**	**For the economic situation in the area**	**For the local stakeholders**
Selling of the public land to a private organization				
Long-term concessions in favour of a Non-governmental organization (NGO).				
Long-term forest concessions signed by (private) enterprises.				
Creation of a company under state control.				

_____

_____

_____

16. Do you expect any changes in forest management of CF due to the ongoing administrative reform in Veneto Agricoltura? Please explain your answer

Yes ☐ No ☐ I do not know ☐

_____

_____

_____

The collected data will be kept strictly confidential, and used only for the purpose of the PhD research activity in an aggregated way. If you are interested, a synthesis of our results and/or a PDF copy of the PhD thesis can be sent to your organization as soon as available.

Thank you for your kind collaboration!

Annex 2b: Questionnaire to follow for the semi structure interview with employees of Veneto Agricultura and the Cansiglio Forest (Italian version)

Questionario per Veneto Agricoltura (VA) e Foresta Cansiglio (FC)

Nome dell'intervistato	
Qualifica/posizione professionale	
Esperienza lavorativa in VA o FC (da quanto tempo lavora in FC o VA?)	
Data e luogo dell'intervista	

Tema: Priorità e obiettivi di gestione

Scopo principale di questa sezione è identificare gli attuali obbiettivi di gestione della FC e definire le prospettive future.

1. Allo stato attuale delle sue conoscenze, quali sono le priorità principali dell'attuale gestione forestale in Cansiglio come definite da leggi e regolamenti? *Spiegare la risposta.*

Dia un giudizio da 0 a 3 (0 – non applicabile, 1 – poco importante, 2 – importante, 3 – molto importante) riguardo ai seguenti obbiettivi

Obiettivi di gestione		**Voto**
Produzione di legname da opera		
Altri Servizi Ecosistemici (dalla classificazione CICES)	Biomassa (legna da ardere)	
	Prati e Pascoli	
	Gestione delle risorse idriche	
	Protezione idrogeologica	
	Protezione suolo da erosione	
	Protezione da eventi estremi (es. uragani)	
	Ventilazione e traspirazione (aria fresca)	
	Biodiversità	
	Controllo parassiti	
	Attività ricreative	
	Spiritiualità e sacralità	
	Educazione ambientale e scienza	
Sono tutte egualmente importanti		
Altro		

_____

_____

_____

1.1 Secondo lei, queste priorità si riflettono nelle modalità con cui FC agisce nella realtà dei fatti? (cioè: sono definite da leggi e regolamenti sulla carta, ma anche davvero perseguite con la pratica delle modalità gestionali?)

_____

_____

_____

2. Lei pensa che le priorità di gestione dovrebbero essere diverse da quelle definite attualmente dalla legge?

Yes ☐ No ☐ I do not know ☐

Se sì, quali dovrebbero essere secondo la sua opinione?

_____

_____

_____

3. Sulla base delle sue conoscenze attuali, quali sono gli obiettivi prefissati e da raggiungere (nei prossimi 5-10 anni)?

_____

_____

_____

Tema: Risultati della gestione

Scopo di questa sezione è rilevare i reali risultati ottenuti dalla gestione della FC e capire come tali risultati siano correlati con gli obiettivi gestionali preposti.

4. Quali sono i risultati attesi dalle attuali iniziative di gestione della FC? Secondo lei, fino a che punto tali obiettivi sono stati raggiunti?

	Risultati	**Raggiunto**	**Raggiunto parzialmente**	**Non raggiunto**	**Non saprei**
4.1					
4.2					
4.3					
4.4					
4.5					

_____

_____

_____

5. Quali sono i risultati gestionali attesi e programmati per i prossimi 5 – 10 anni? *Spiegare in dettaglio*.

_____
_____
_____

5.1 Secondo la sua opinione, tali risultati sono adeguati o dovrebbero invece essere diversi? *Spiegare cosa dovrebbe cambiare (quali risultati si dovrebbero definire al posto di quelli attualmente previsti)*.

_____
_____
_____

6. Secondo lei, quali sono gli aspetti positivi e le opportunità, e quali invece quelli negativi e le difficoltà nel modo con cui la foresta è gestita in merito a…

		Problemi/difficoltà	**Aspetti positivi/opportunità**
6.1	...questioni tecniche		
6.2	… aspetti logistici/organizzativi		
6.3	…relazioni con portatori di interessi (stakeholder)		
6.4	…budget		
6.5	…comunicazione		
6.6	altro		

_____
_____
_____

7. Come vengono usate, attualmente, le entrate che derivano dall'area forestale produttiva del Cansiglio? *Spiegare la risposta*

Le entrate vengono destinate alle casse statali/VA budget	
Le entrate sono reinvestite nella gestione della foresta	
Le entrate sono utilizzate per il mantenimento e il miglioramenteo della produzione di servizi ecosistemici (es. gestione delle acque, protezione del suolo, salubrità dell'aria, ecc.)	
Altro	

_____
_____
_____

7.1Secondo le sue conoscenze attuali, le entrate ottenute dall'area di bosco produttivo cambieranno nei prossimi 5 – 10 anni? Se si, come? (maggiori, minori, stabili)

Yes ☐ No ☐ I do not know ☐

_____
_____
_____

8. Quale pensa che sia il maggiore successo ottenuto negli ultimi 5 – 10 anni di gestione della Foresta del Cansiglio?

_____
_____
_____

9. Quale pensi che sia il maggior fallimento ottenuto negli ultimi 5 – 10 anni di gestione della Foresta del Cansiglio?

_____
_____
_____

10. Come vede il futuro della FC? Nel mondo reale (come pensa che si evolverà realisticamente) e in un mondo perfetto (cosa sogna/spera che accada)?

_____
_____
_____

Tema: Modelli di gestione

Con l'aiuto di questa sezione vorremmo capire come la FC è gestita da un punto di vista organizzativo. Questo aiuterà a confrontare FC e VA con alcune delle diverse modalità di gestione delle Aziende Forestali Statali in altri paesi europei.

11. Può descrivere brevemente l'attuale processo decisionale riguardo alla gestione della FC? (chi decide cosa, chi viene consultato e quando, come sono i flussi decisionali, ecc.)

_____
_____
_____

11.1 Chi prende l'ultima decisione su…?

	…budget della FC	… gestione forestale della FC	… questioni amministrative della FC
Governo			
Regione Veneto			
Veneto Agricoltura			
Amministrazione della FC			
Altro			

_____

_____

11.2 Quali portatori di interersse hanno influenza sulle decisioni prese riguardo la gestione della FC? Può indicare fino a che punto gli stakeholder elencati possono influenzare le decisioni di tale gestione? (0 – non applicabile/nessuna capacità, 1 – bassa capacità, 2 – capacità media, 3 – elevata capacità)

Partiti politici (specificare)		Ambientalisti (specificare)	
Associazioni di Categoria: CIA, Coldiretti, Confagricoltura		Residenti del Cansiglio (es. comune di Tambre) Residenti delle aree limitrofe (es. comune di Belluno o comunque di Vittorio Veneto e altri di pianura)	
Agricoltori e allevatori (come singoli)		Fruitori della foresta (es. visitatori, associazioni sortive,…)	
Associazioni di caccia (specificare)		Mondo accademico/scientifico (ricercatori)	
Cacciatori (come singoli)		Altro	

_____

_____

_____

Yes ☐ No ☐ I do not know ☐

12 Pensa che l' attuale modello organizzativo sia efficiente rispetto ai risultati pianificati?

Se sì, qual è il fattore chiave di tale successo?
Se no, cosa può essere migliorato o cambiato? Come?

_____

_____

_____

13 Attualmente la FC è parzialmente sovvenzionata dallo regione e ha qualche entrata derivante dalla vendita di legname che è reinvestito per le necessità della FC. Lei è soddisfatto/a di questo modello organizzativo?

Yes ☐ No ☐

Se sì, quali sono le ragioni per cui lo è (soddisfatto)?
Se no, cosa vorrebbe cambiare? E come?

_____

_____

_____

13.1 Quale pensa che sarà nei prossimi 5 – 10 anni la maggiore fonte di entrate per la gestione di FC? E nei prossimi 50 anni?

_____

_____

_____

14 La FC è di proprietà della regione. Secondo lei, vi saranno dei cambiamenti nelle forme di proprietà della FC nei prossimi anni? *Spiegare la risposta.*

	Breve periodo (5-10 anni)		**Medio periodo (10-30 anni)**		**Lungo periodo (più di 30 anni)**	
	Foresta	Attività Commerciali	Foresta	Attività Commerciali	Foresta	Attività Commerciali
Rimarrà di proprietà dello stato						
Concessioni a lungo termine ad altre autorità pubbliche						
Concessioni lungo termine a organizzazioni private						
Privatizzazione (terreni venduti ai privati)						
Altro (specificare)						
Non so						

_____

_____

_____

14.1 La FC è di proprietà della regione. Secondo lei, quale cambiamento dovrebbe essere apportato nei prossimi anni al regime di priorità della Foresta del Cansiglio? *Spiegare la risposta.*

	Breve periodo (5-10 anni)		**Medio periodo (10-30 anni)**		**Lungo periodo (più di 30 anni)**	
	Foresta	Attività Commerciali	Foresta	Attività Commerciali	Foresta	Attività Commerciali
Rimarrà di proprietà della regione						

Concessioni a lungo termine ad altre autorità pubbliche						
Concessioni lungo termine a organizzazioni private						
Privatizzazione (terreni venduti a privati)						
Altro (specificare)						
Non so						

_____

_____

_____

15 Se la proprietà della FC fosse diversa, cosa cambierebbe per…?

	… la foresta	**… l'ambiente**	**… la situazione economica dell'area**	**… i portatori di interesse dell'area**
Vendita del suolo pubblico ad un'organizzazione privata				
Concessioni a lungo termine in favore di ONG				
Concessioni a lungo termine del bosco in favore di una impresa privata				
Privatizzazione di tutte le operazioni gestionali, con la creazione di una impresa sotto controllo dello stato				

16. Si aspetta qualche cambiamento nella gestione della FC in conseguenza alla riforma amministrativa in corso di Veneto Agricoltura? Cortesemente, spiega la tua risposta

Yes ☐ No ☐ I do not know ☐

_____

_____

_____

Grazie per la Sua gentile collaborazione!

Annex 3: High resolution figures

Figure 1.1: Forest ownership in the European countries (data from EUROSTAT, 2011)

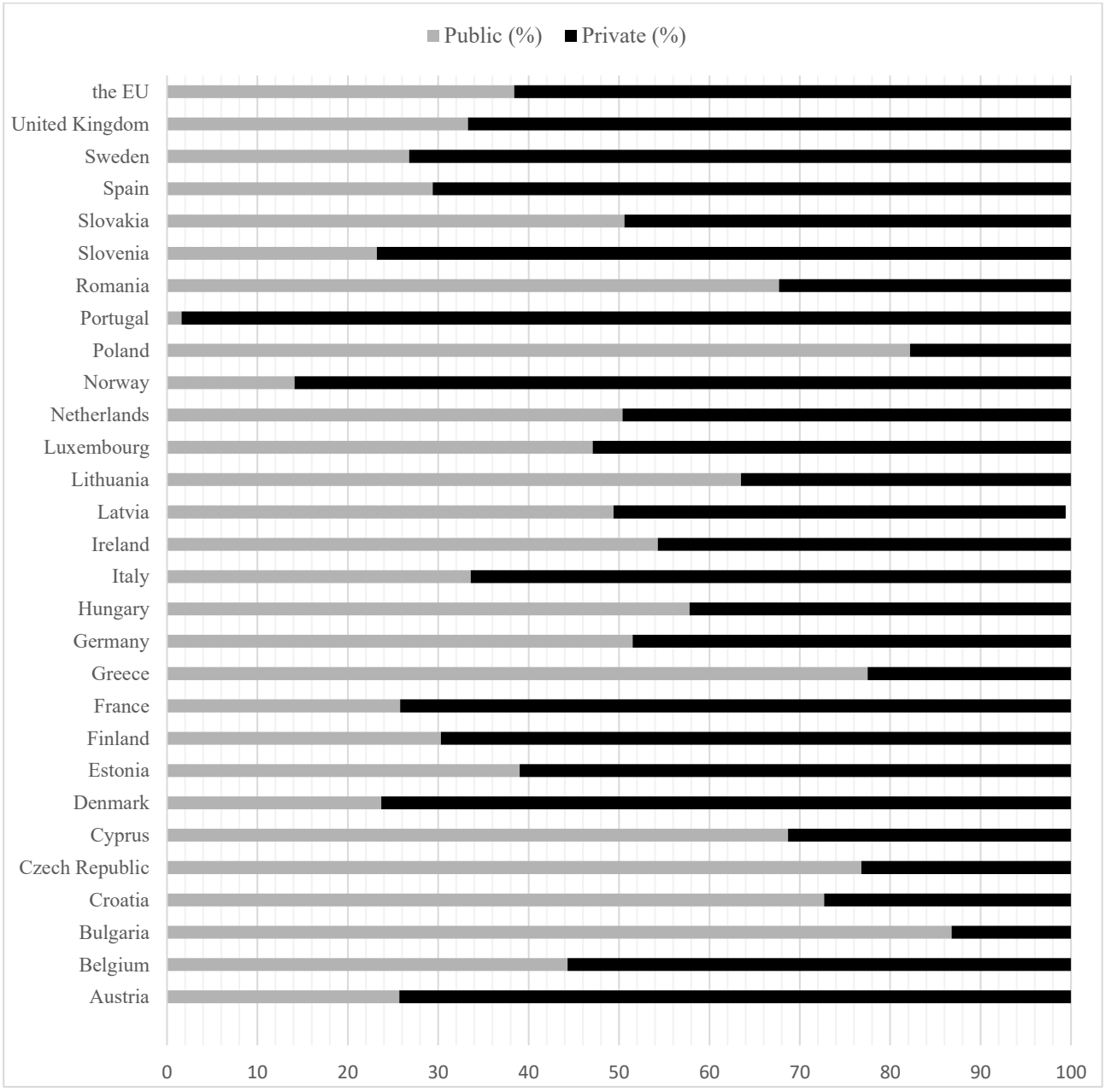

Figure 1.2: The two dimensions of organizational hybridity (from Quélin et al., 2017, p.772)

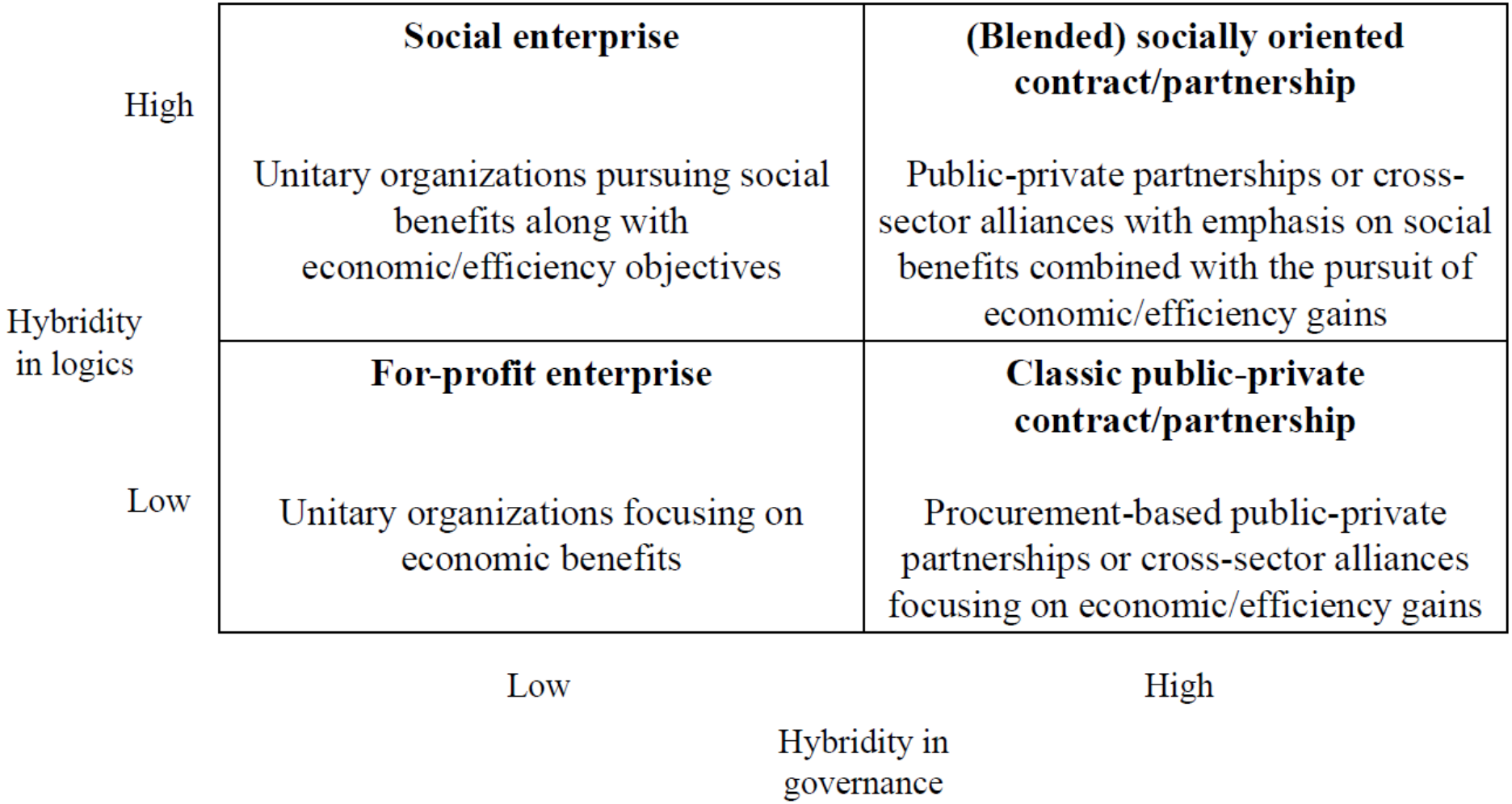

Figure 1.3: Variety of organizational forms (from MacCarthaigh, 2011, p.5)

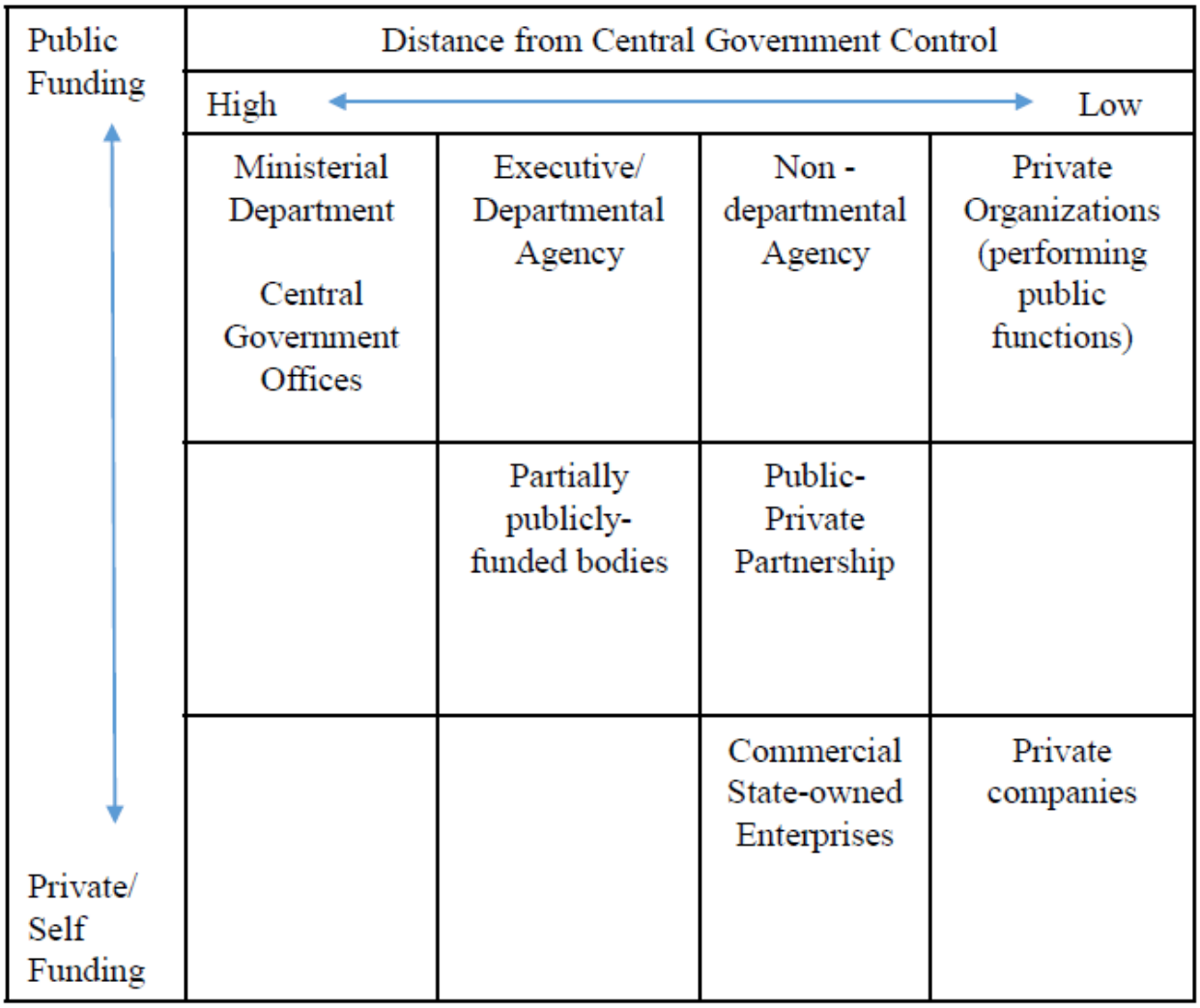

Figure 1.4: SFMO management models (own elaboration based on PROFOR (2005), Sotirov (2014), Kant (2009), Chang (2007))

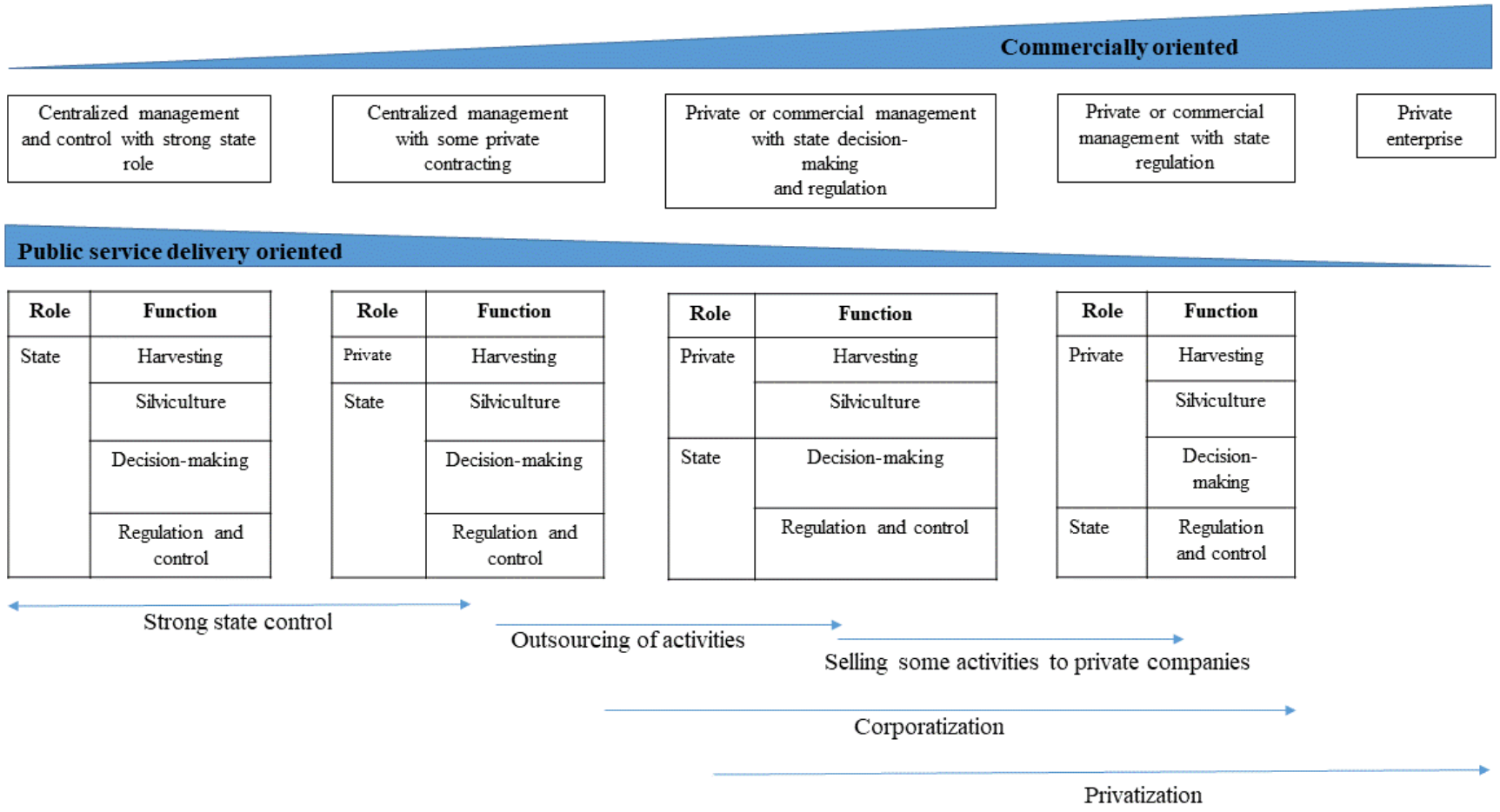

Figure 3.1: Correlation among quantitative variables

(Blue color means there is a positive correlation; red means a negative correlation. The darker the color, the stronger the correlation. White square means there is no significant correlation).

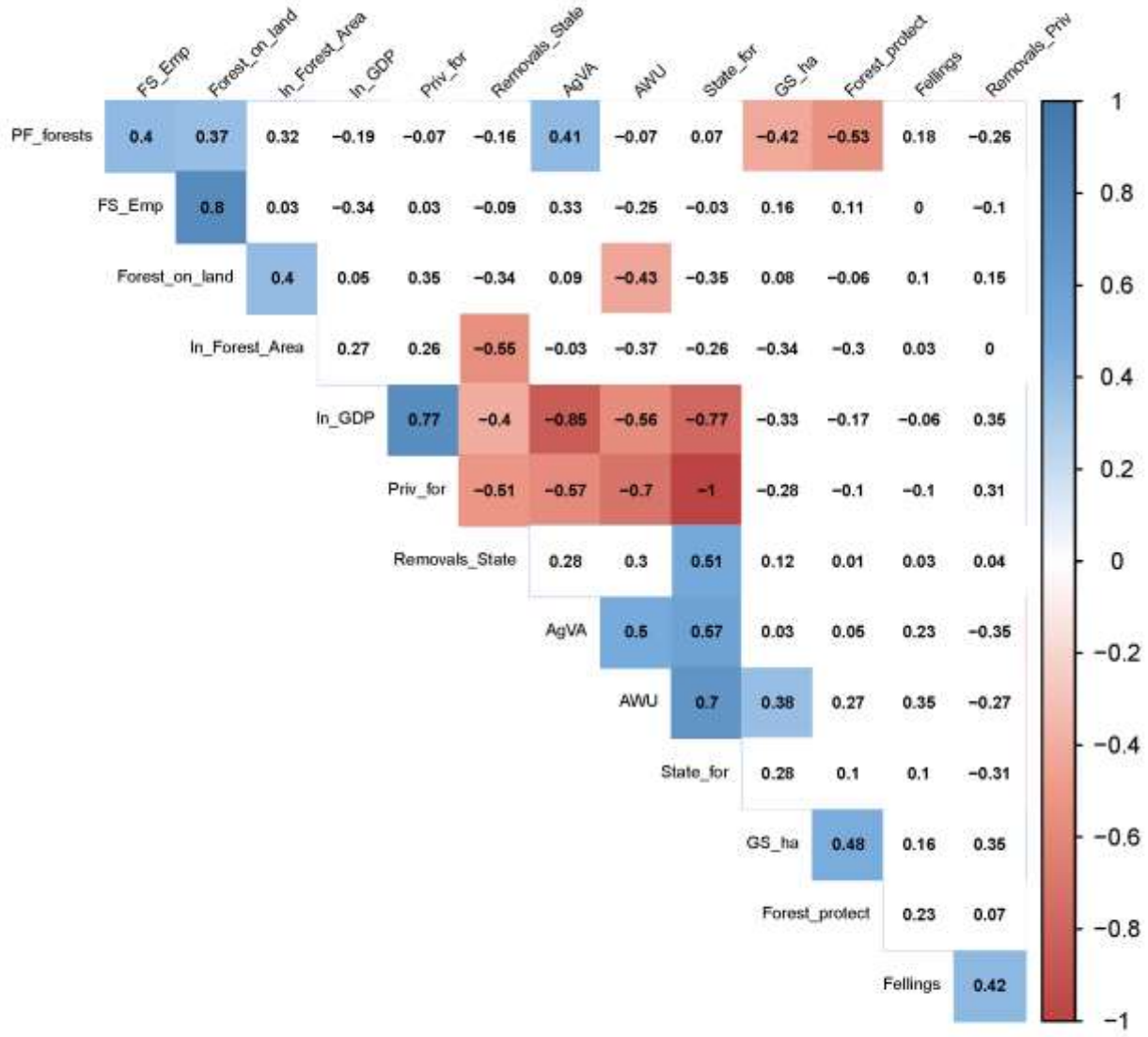

Figure 3.2: Countries score for the first and second PCs

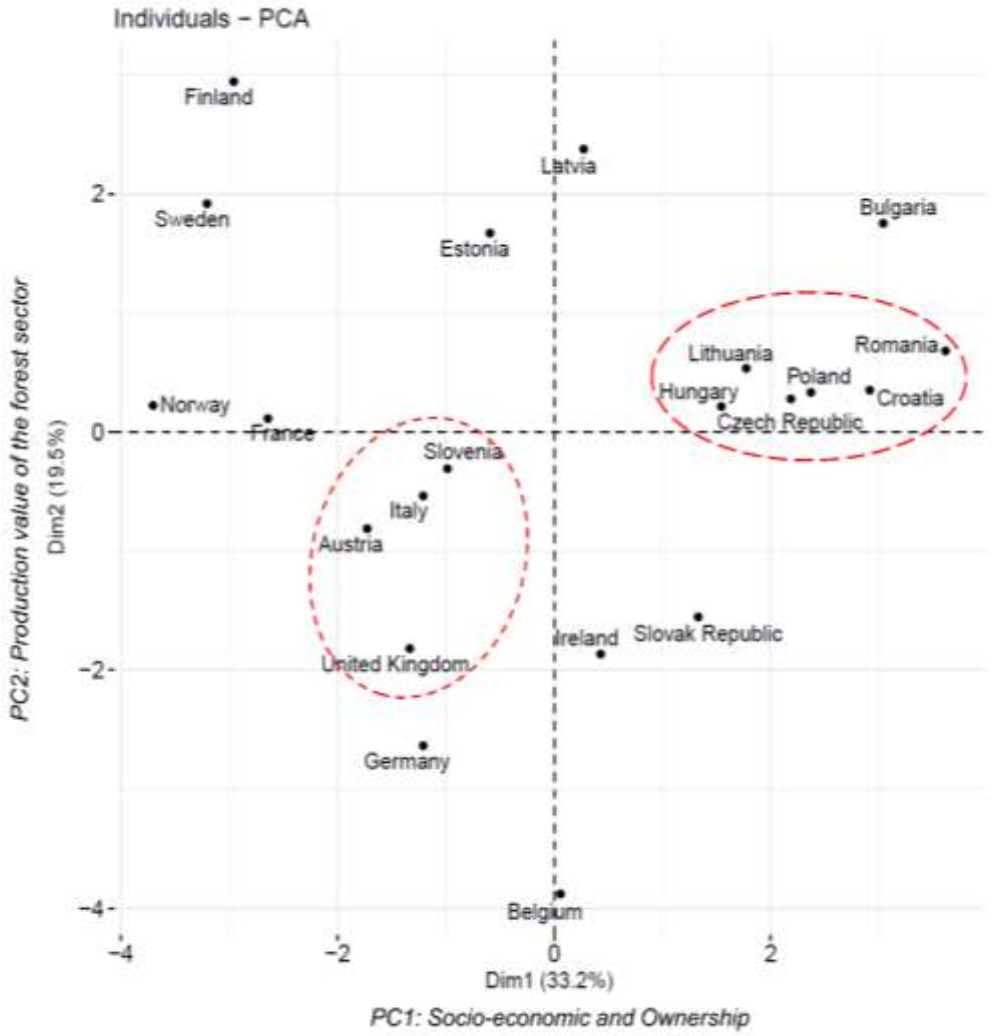

Figure 3.3: Countries score for the first and third PCs

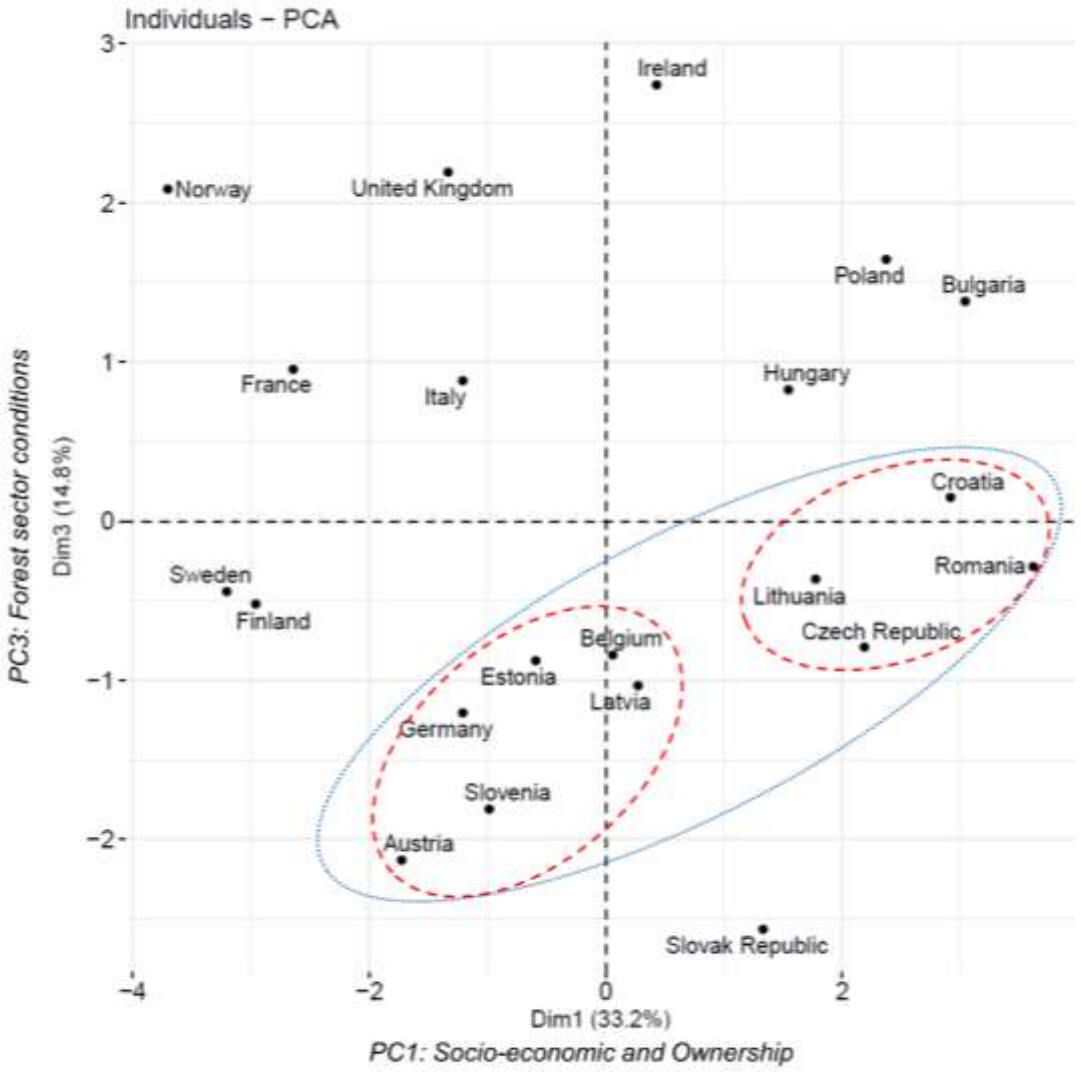

Figure 3.4: Cluster analysis of SFMOs

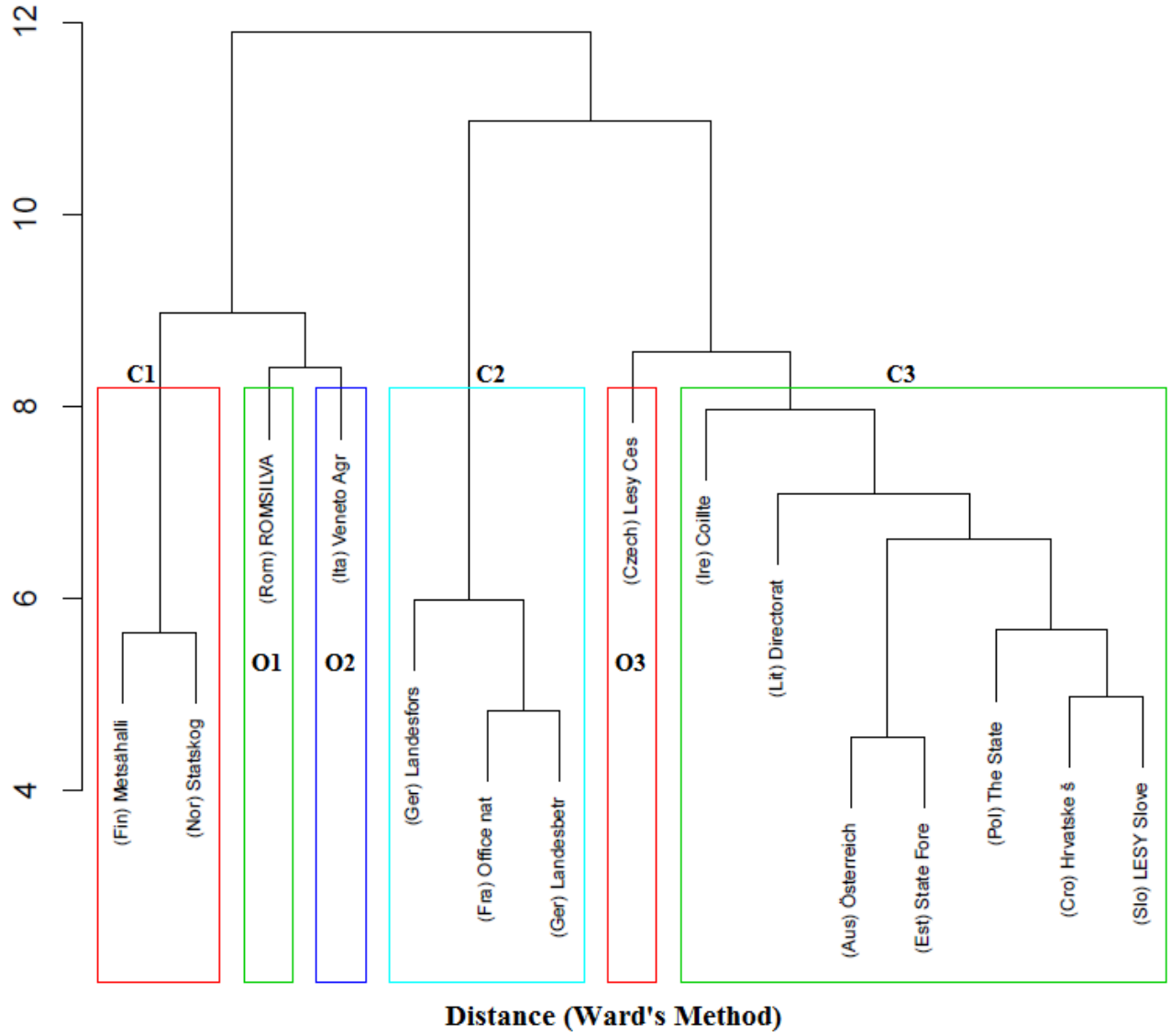

Figure 3.5: Labour productivity in SFMOs (own elaboration)

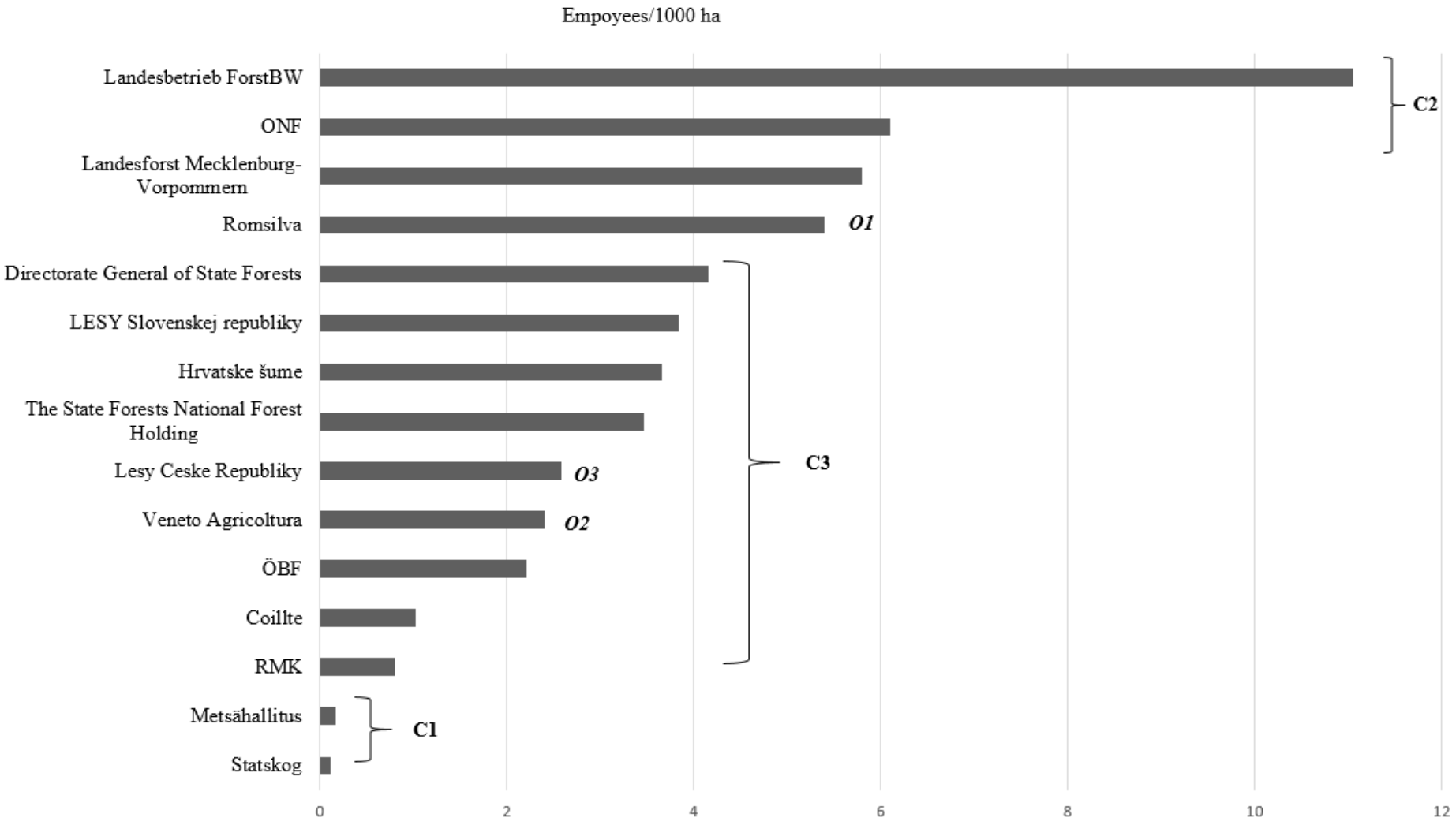

Figure 4.1: Map with the location of the Cansiglio forest (own elaboration)